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REPORT

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

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Introduction

The Consent Agreement (CA) As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a), the Federal Facility Compliance Agreement (FFCA), and the Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA) signed September 20, 1991, July 18, 1986, and November 19, 1991, respectively, require that monthly reports be submitted to the U.S. EPA regarding progress made to meet the provisions of those agreements. This report fulfills those requirements by describing actions undertaken at the Fernald Environmental Management Project (FEMP) during the period July 1 through July 31, 1993, and planned actions for the period August 1 through August 31, 1993.

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WORK ASSIGNMENTS AND PROGRESS

Descriptions of work progress are presented in the following sections and/or enclosures to this report:

- o CA Section IX - Removal Actions.
- o CA Section X - Remedial Investigation/Feasibility Study.
- o Enclosure A - Wastewater Flows and Radionuclide Concentrations under CA Section XXIII.B.
- o Enclosure B - FFCA: Initial Remedial Measures and Other Open Actions.
- o Enclosure C - FFA: Control and Abatement of Radon-222 Emissions.
- o Enclosure D - Drilling/Boring Logs

CA Section IX. Removal Actions

This section provides an update of activities associated with the implementation of Removal Actions (RAs) at the FEMP during June 1993. Information is presented for each of the Removal Actions identified in the Consent Agreement As Amended.

Phase I Removal Actions

- o RA No. 1, Contaminated Water Under FEMP Buildings.
- o RA No. 2, Waste Pit Area Run-off Control.
- o RA No. 3, South Groundwater Contamination Plume.
- o RA No. 4, Silos 1 and 2.
- o RA No. 5, Decant Sump Tank.
- o RA No. 6, Waste Pit 6 Residues.
- o RA No. 7, Plant 1 Pad Continuing Release.

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Phase II Removal Actions

- RA No. 8, Inactive Flyash Pile Control.
- RA No. 9, Removal of Waste Inventories.
- RA No. 10, Active Flyash Pile Controls.
- RA No. 11, Pit 5 Experimental Treatment Facility.
- RA No. 12, Safe Shutdown.
- RA No. 13, Plant 1 Ore Silos.
- RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator.
- RA No. 15, Scrap Metal Piles.
- RA No. 16, Collect Uncontrolled Production Area Runoff--Northeast.
- RA No. 17, Improved Storage of Soil and Debris.
- RA No. 18, Control Exposed Material in Pit 5.

Phase III Removal Actions

- RA No. 19, Plant 7 Dismantling.
- RA No. 20, Stabilization of UNH Inventories.
- RA No. 21, Expedited Silo 3.
- RA No. 22, Waste Pit Area Containment Improvement.
- RA No. 23, Inactive Flyash Pile.
- RA No. 24, Pilot Plant Sump.

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CA Section IX. Removal Actions (continued)

- RA No. 25, Nitric Acid Tank Car and Area.
- RA No. 26, Asbestos Removals (Asbestos Program).
- RA No. 27, Management of Contaminated Structures at the FEMP.
- RA No. 28, Contamination at the Fire Training Facility

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RA No. 1, Contaminated Water Under FEMP Buildings

Pumping at all Plants and treatment of perched groundwater remained halted during July due to the spill of Uranyl Nitrate Hexahydrate on April 27 and the subsequent shutdown of all Plant 8 operations.

RA No. 2, Waste Pit Area Runoff Control

This removal action was completed on August 30, 1992.

RA No. 3, South Groundwater Contamination Plume

Part 1

On January 31, 1991, the U.S. EPA approved the Work Plan for Part 1, Alternate Water Supply for two industrial users, Albright & Wilson Americas and Delta Steel. Subsequently, The U.S. EPA and Ohio EPA approved deleting Delta Steel from the current scope of the project. The Delta Steel hookup will be delayed until the planned public water supply can service the facility. The FEMP prepared a revised Work Plan (Revision 1) and issued it to the EPAs to reflect this and other changes that have occurred. A summary of the most recent and ongoing activities for Part 1 are listed below:

The FEMP completed a 60-day continuous testing period on May 24, 1993. The continuous test was delayed until plan received approval from the Ohio EPA. The system continues to operate satisfactorily. Provisions are being made to turn possession of the system over to AWA. Legal representatives from the Justice Department and Albright & Wilson Americas are handling final acceptance of the alternate water supply. Negotiations for easement payments to several affected property owners continues. A court hearing was held June 7, 1993, on the Linesch property with the final judgement ruled in favor of DOE.

Part 2

This project was divided into five construction bid packages. These include: 2A - groundwater discharge pipeline (pressure flow) and outfall pipeline (gravity flow) from south of Willey Road to and including Manhole 183B; 2B1 - Manhole 183B to Great Miami River; 2B2 - Aeration Facility; 2C - recovery well field; and 2D - test well installation and pump test. The following is the status of the Part 2 activities:

The FEMP installed the Outfall Pipeline section of Part 2A and 2B1 portions of the projects, and they were operational on May 1, 1993. Accordingly, the existing outfall pipeline was removed from service. This removes an EPA concern that the existing pipeline was subject to leaking.

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RA No. 3, South Groundwater Contamination Plume (continued)

The FEMP completed the last phase of the Part 2D pump test on June 5. The FEMP analyzed the data obtained from each phase of the pump test (step drawdown, constant rate, and recovery period) to evaluate the various hydrogeologic parameters of the aquifer in the immediate vicinity of the South Plume Well Field. Based on the results, The FEMP prepared a vertical capture letter. This letter assessed preliminary pump test results, determined that the planned pumping rate for the South Plume Recovery System should be adequate, and confirmed the previously recommended lengths and depths of the screened interval for the remaining four South Plume recovery wells. A meeting was held on June 30 to present the data to OEPA and U.S. EPA before proceeding with the remaining well installation. Subsequently, The FEMP drilled the remaining four recovery wells. The pumps and screens will be set the week of August 2, 1993. The well field construction is on schedule for completion before the August 28 start up date. Final analysis of the data and a pump test report are in progress.

The FEMP completed installation of the new 700 gpm pumps at the Stormwater Retention Basin. This increased flow rate will increase the probability that no overflow of the Stormwater Retention Basin will occur in the future.

Part 3

The FEMP prepared the Work Plan for Parts 2 and 3 as one document. The plan entails installing and operating an Interim Advanced Wastewater Treatment (IAWWT) System to reduce uranium contaminant loading discharged to the Great Miami River to a level less than 1,700 pounds per year. Due to the relocation of the Part 2 well field to an area having a higher concentration of uranium, the IAWWT system capacity was expanded to maintain the 1,700 pound per year maximum level. The IAWWT system includes two treatment units. The IAWWT unit located at the Storm Water Retention Basin consists of two trailer-mounted assemblies, each with a nominal 150 gpm capacity or a total nominal 300 gpm capacity. The unit located at the Biodenitrification Effluent Treatment System has a nominal capacity of 100 gpm. Current activities are described below.

<u>IAWWT Stormwater Retention Basin Unit</u>

During July the IAWWT Stormwater Retention Basin Unit operated when stormwater and Cartridge Filter elements were available. However, the units continue to use cartridge filter elements excessively during operation, and the FEMP has had problems keeping the filter elements in stock. Accordingly, plans are being made to install multimedia filtration upstream of the Ion Exchange units. The filter units will be installed in the Uranium Reduction in FEMP Discharge facility discussed in Section 5.

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RA No. 3, South Groundwater Contamination Plume (continued)

IAWWT Biodenitrification Effluent Treatment System Unit

The FEMP received the new Sand Filtration system on July 14, and it is currently being installed. Installation will be complete by August 9. The FEMP has not received the two new ion exchange vessels; however, the system will be able to run at up to 50 gallons/minute using the one existing ion exchange vessel that will be retained. One ion exchange vessel will begin operation the week of August 16, with the startup of the remaining ion exchange vessels shortly thereafter.

Part 4

Part 4 of the South Groundwater Contamination Plume Removal Action Work Plan involves groundwater monitoring and institutional controls.

Private homeowner and existing RI/FS well sampling in the South Plume area continues. The two homeowner treatment systems installed south of the FEMP continue to operate successfully.

Part 5

Part 5 was added to the South Plume in order to address the relocation of the Part 2 well field. It includes the groundwater modeling and geochemical investigation of an area south of the well field to determine the location of the leading edge of the 20 ppb uranium-contaminated groundwater. Part 5 includes evaluating the location of plumes associated with the Paddy's Run Road Site and the impact on these plumes by pumping the FEMP Part 2 Recovery Well Field. Part 5 also includes performing the required field sampling, data analysis and computer modeling flow and particle tracking to enable setting the location and design of the Part 2 Recovery Well Field.

The geochemical investigation is divided into four phases:

Phase I - two traverse lines of hydropunch borings within the alluvium area and concurrent sampling of existing nearby wells. The FEMP completed Phase I on August 25, 1992. Only one hydropunch sample exceeded 20 ppb uranium.

Phase II - two traverse lines of monitoring wells with corresponding hydropunch sampling north and south of the proposed recovery well field. Phase II began in late March 1993. Six 2000-series wells and four 3000-series wells have been completed. Three 2000-series wells (the primary wells) and one 3000-series well were installed prior to the Part 2D Pump Test. The remaining two 3000-series wells will be completed in August.

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RA No. 3, South Groundwater Contamination Plume (continued)

Phase III - seven piezometers clustered near proposed extraction well R-4. The seven piezometer cluster located near proposed Recovery Well No. 4 was installed in early May as part of the Part 2D pump test construction package. Samples from these piezometers were taken to evaluate the vertical extent of the uranium contamination within the aquifer. Hydropunch investigations associated with Phase III have identified two piezometers (3916 and 3917) where uranium samples exceeded 20 ppb.

Phase IV - soil vapor sampling.

A need and location for a soil vapor survey will be determined after 20 ppb isopleth is located and Phase I, II, III, data and proposed pumping under the Design, Monitoring, and Evaluation Program Plan are evaluated. After all uranium data is collected from Phases I, II, and III, a summary report of the 20 ppb isopleth will be prepared.

RA No. 4, Silos 1 and 2

Completed the installation bentonite in Silos 1 and 2 on November 28, 1991.

The DOE submitted an evaluation detailing a revised method for determining the effectiveness of the bentonite in the silos to the U.S. EPA on December 17, 1992. As discussed with U.S. EPA on April 13, 1993, information contained in the revised Bentonite Effectiveness Evaluation document will be incorporated into the Removal Action Final Report.

As defined in the Removal Action Work Plan and the FFA-CARE, Enclosure C includes data associated with monitoring the effectiveness of the bentonite installation.

RA No. 5, K-65 Decant Sump Tank

The FEMP completed removal of the liquid from the K-65 Decant Sump Tank on April 16, 1991, when the liquid was transferred to the holding tanks in Plant 2/3. Treatment of the decant liquid based on the Material Evaluation Form and available analytical results was completed on May 12, 1992.

Current activities include monitoring the liquid level of the K-65 Decant Sump Tank and performing maintenance as required. Per requirements of the Work Plan, Operable Unit 4 will advise DOE-FN when pumping operations are to resume.

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RA No. 6, Waste Pit Residues

This removal action was completed December 19, 1990.

RA No. 7, Plant 1 Pad Continuing Release

This removal action consists of three stages. Stage I, which implements the run-on/off control measures, is complete. Stage II, addressing the installation of 80,000 square feet of a newly covered and controlled concrete storage pad, is complete. Stage III involves activities to upgrade the remaining 375,000 square feet of the existing Plant 1 storage pad. Stage III upgrading activities include installation of a polymeric vapor barrier over the existing concrete and the installation of concrete above the barrier with an epoxy sealant. In addition, 22,500 square feet of the Stage III work area will be enclosed beneath a tension support structure.

Drum movements to clear off Phases C and D, have been completed. The drum movements were required to clear areas for construction.

The bids for Stage III (Phases C, D, and E) were received June 18, 1993, as scheduled. FERMCO approved IND-COM Builders Inc. as the successful low bidder and submitted the package to DOE on July 12, 1993. DOE-FN approved the package on July 23. DOE-Oak Ridge approval and the subsequent mobilization of the subcontractor are expected in mid-August.

KEY MILESTONES	STATUS	DUE DATE
Complete Stage III	Open, behind schedule	February 19, 1995

RA No. 8, Inactive Flyash Pile Control

The Inactive Flyash Pile Isolation Activity was completed ahead of schedule on December 23, 1991.

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RA No. 9, Removal of Waste Inventories

During July 1993, 10,491 drum equivalents of low-level waste were dispositioned. Repackaging material has reduced the year-to-date disposal volume shipped to the Nevada Test Site by 2,931 drum equivalents. The FY 1993 goal is to dispose of 67,000 drum equivalents of low-level waste at the Nevada Test Site and 50,000 drum equivalents of low-level waste through subcontractors.

The activities completed in July include the annual update submittal to the administrative record of waste shipments for the past six months. DOE-NV also completed its annual recertification audit of the FEMP Application to ship waste to the Nevada Test Site, Revision 5.0. The audit was conducted July 26 through 30, 1993. The audit covered the five new waste streams, including the AMCCOM metal (4A), regulated asbestos, metal melt slag from SEG, and two new thorium waste streams. The DOE-NV audit team discovered several significant findings. However, DOE-NV agreed to give the FEMP 30 days to complete significant corrective action in lieu of an immediate suspension of all waste shipments to the Nevada Test Site. This agreement was based on the high degree of confidence DOE-NV audit personnel have in the FEMP waste shipping and certification personnel and the demonstrated management support for these personnel. To meet the commitment and provide significant closure of the findings in 30 days, five project teams have been identified to effect corrective actions.

Waste shipping activities for August will include the closure of the audit findings as committed to DOE-NV. The FEMP must close out the audit findings to maintain its waste shipping/certification program approval and to continue shipping to the Nevada Test Site. The FEMP will provide sampling and analysis results to DOE-NV for final approval of the Sampling and Analysis Plan.

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Completed on June 30, 1993	June 30, 1993

RA No. 10, Active Flyash Pile Controls

This removal action was completed on June 29, 1992. Any required maintenance will be conducted as required.

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RA No. 11, Pit 5 Experimental Treatment Facility

This removal action was completed on March 20, 1992.

RA No. 12, Safe Shutdown

The Safe Shutdown Removal Action documents the activities that will remove uranium and other material from equipment and pipelines in former processing equipment. It will dispose of the removed material and equipment off site.

KEY MILESTONES	STATUS	DUE DATE
Submit Annual Work Procedures for 1993	Completed on June 30, 1993	June 30, 1993

In July, FERMCO completed internal evaluations of the Operational Readiness Review, which will allow Safe Shutdown to proceed. FERMCO is scheduled to submit its review to DOE-FN the first week of August. DOE-FN will complete an Operational Readiness Evaluation to assess the FERMCO review, so work can proceed.

Safe Shutdown is continuing its Equipment and Material Assessments, formerly known as Preliminary Assessments. FERMCO completed field evaluations of Plants 1, 7, and 8, and the field evaluation of Plants 4 and 9 are in process. FERMCO is preparing red-line, as-built floor plan drawings for Plants 4 and 9 to show where equipment is located.

The database currently includes 2,887 expense items. Of these, FERMCO verified 1,420 items, and 578 are on a "shopping list" to determine onsite use. FERMCO transferred 1,042 items to Maintenance and placed 121 items on AC-563 Forms as excess. These numbers may fluctuate from month to month as field verification continues.

Of an estimated 1,694 capital equipment items in the database, FERMCO placed 1,190 items on AC-563 Forms as excess and identified 504 as "In Use/Future Use" items. The number of items on AC-563 Forms and the "In Use/Future Use" listing may vary if the status of the equipment changes.

FERMCO prepared 643 maintenance work orders to isolate and disconnect all utilities from equipment not in use. Of these, FERMCO completed 248, and is still verifying these completed orders. Completing these work orders is a preliminary step in extracting materials from the equipment before removing it for decontamination and decommissioning. These numbers may vary from month-to-month if the status of the equipment changes.

RA No. 12, Safe Shutdown (continued)

Phase II of the 4A Metal Removal Project covers shipping approximately 1,028 metric tons of uranium from the Army's Material Description Code 228 to the NTS. The Army had been negotiating an application with the NTS on its own. At a meeting held on June 3 at NTS, however, representatives of the Army, DOE-FN, DOE-NV, and FERMCO agreed to ship the uranium under FERMCO's permit. FERMCO submitted a revised agreement to DOE-FN on July 16, 1993, to cover the additional funds needed for certification, classified freight, and burial costs. FERMCO received concurrence with the agreement on July 26, 1993, and included the material in the annual NTS audit the week of July 26. The date for removing the material depends on the results of the audit. To date, FERMCO has installed more than 640 Nucfil vents and packaged 266 white metal boxes of the 345 projected for the project.

DOE-FN reviewed the bids on the sale of normal and enriched uranium (RFP SD-417) and for depleted uranium (RFP SD-416). DOE-FN also made a recommendation to DOE-HQ on awarding the contracts. Two successful bidders emerged on portions of the FEMP's depleted uranium: Manufacturing Sciences for 440 metric tons uranium (MTU) and British Nuclear Fuels, Inc. for ~120 MTU. Compagnie Generale des Matieres Nuclearies (COGEMA) of Pierrelatte, France, was the successful bidder on 1,478 MTU of the FEMP's normal and enriched uranium. The materials will be removed from the site over a two-to-three-year period beginning after the contracts are signed or after the Environmental Assessment, whichever is later. Now that the sale is complete, Safe Shutdown will be considering disposal options for the unsold materials, a portion of which does not currently meet waste acceptance criteria.

During August, the FEMP will continue packaging the Army material for shipment to NTS and continue following the progress on contracts for the sale of uranium. The FEMP will also continue to issue work orders for utility isolation work and will pursue completion of the Operational Readiness Review. Other key efforts include continuing to develop implementation plans for removing materials from process equipment, and continuing to verify equipment and material evaluations for Plants 4 and 9.

RA No. 13, Plant 1 Ore Silos

The Plant 1 Ore Silos Removal Action will include the dismantling of the 14 Plant 1 Ore silos and their support structure. This dismantling will eliminate the potential threat of additional material releases and the safety hazard due to structural deterioration of the silos and their support structure. The activities in this removal action will include characterization, removal, containerization, and disposal of the materials making up the above-ground portion of the facility.

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RA No. 13, Plant 1 Ore Silos (continued)

The Size Reduction Building (SRB) has been erected and the ventilating system is being installed. The electric for the SRB is to be completed by August 16, 1993. The Gantry Crane has been installed and a load test will be performed when the electric has been connected. Scaffolding is being installed around the concrete silos. The project is presently 25 days behind schedule.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open	December 19, 1994

RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator

This removal action will include the isolation or removal and disposition of contaminated soils in the vicinity of the Sewage Treatment Plant. This action will eliminate the potential threat of additional material releases to the environmental media through migration. The activities in this removal action will include characterization, removal, containerization, and storage/disposal of the materials.

The 187 white metal boxes from Phase II sampled for RCRA determination in May have been determined to be non-RCRA; these soils, therefore, will eventually be stockpiled per Removal Action Number 17, Improved Storage of Soil and Debris.

The initial walkover survey for off-property contamination was completed in June. July activities included laying out 25' x 25' grids within the initial walkover survey and performing the second walkover survey. Scheduled August activities include the start of on-property excavations and the off-property area immediately east of the sewage treatment plant. The intrusive soil sampling off-property should be completed.

The revised Work Plan Addendum was submitted to EPA on July 12, 1993.

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RA No. 14, Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator (continued)

KEY MILESTONES	STATUS	DUE DATE
Phase III - Tentative completion of off-property and on-property excavations	Additional sampling to determine boundary of contamination	February 25, 1994
Phase IV - Tentative Submittal of Final Report	Open	September 26, 1994

RA No. 15, Scrap Metal Piles

The Scrap Metal Piles Removal Action will detail the stabilization and disposition of LLW scrap metal currently stockpiled on site. This removal action will minimize material releases to the environment. Approximately 1,400 tons of scrap copper along with approximately 2,200 tons of recoverable scrap metals are the focus of this removal action.

Containerization of the Phase I scrap metal pile at the B69 pad began in February. A total of 17.5 tons of non-ferrous metal has been shipped to Quadrex and 1,638 tons of ferrous metal have been shipped to SEG. All scrap metal anticipated to be packaged by August 3, 1993.

Off-site shipments of the containers to continue during the month of August. 1000 tons of ferrous metal has been melted and made into shield blocks for DOE's high energy physics applications. SEG began demobilization on July 28, 1993.

The pre-proposal meeting for the Phase IIB subcontract was held on March 18. The bids were originally due in April. This was delay by the need to conduct an isotopic evaluation of the scrap copper. The Source Evaluation Board will select the subcontractor by August 20. Contract award is scheduled for completion before September 30. The subcontractor removal action project plan will be submitted to FERMCO 30 days after the contract award.

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RA No. 15, Scrap Metal Piles (continued)

KEY MILESTONES	STATUS	DUE DATE
Complete Phase I	Open, on schedule	March 30, 1994
Phase I - Submit Final Report	Open, on schedule	September 30, 1994
Phase IIB: Submittal of Subcontractor's Removal Action Plan	Open, behind Schedule	September 30, 1993
Phase IIB: Submittal of Final Report	Open, on schedule	March 30, 1995

RA No. 16, Collect Uncontrolled Production Area Runoff -- Northeast

The scope of this removal action is to collect the remaining stormwater runoff from the perimeter of the 136 acre former production area that currently discharges to Paddy's Run and divert it through the existing storm sewer system to the Storm Water Retention Basin. Construction activities are complete on the trench drains. Construction is also complete on all 13 new catch basins. The contractor has recovered the schedule deficit and will complete the project prior to the August 30, 1993, commitment date.

KEY MILESTONES	STATUS	DUE DATE
Complete Removal Action	Open, on schedule	August 30, 1993

RA No. 17, Improved Storage of Soil and Debris

This removal action will include the management and appropriate storage of contaminated soil and debris on site. This will eliminate the potential threat of additional material releases to the environment due to wind, rain, or vehicular traffic. The activities in this Removal Action will include characterization, interim storage, and management of the contaminated soil and debris materials until final remediation under Operable Unit 3.

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RA No. 17, Improved Storage of Soil and Debris (continued)

The Davis-Bacon ruling for the first design and construction package for this removal action was received on June 7. The revised Request for Exemption for installing automatic sprinklers in tension support structures was submitted to DOE-HQ on June 7. All design issues for the first design package have been concurred upon by DOE-FN and FERMCO as of June 11. DOE-FN granted approval on July 27 to complete the design for the Central Storage Facility as part of the RA 17 Phase I Design Package. The project-specific Health and Safety Plan was approved on July 7, 1993.

The Part II design package (Decontamination Facility Pad and the soil and rubble pile cover) will begin in August.

RA No. 18, Control Exposed Material in Pit 5

This removal action was completed on June 4, 1993. A final report is being prepared.

RA No. 19, Plant 7 Dismantling

The Plant 7 Dismantling Removal Action will include dismantling and disposing of the Plant 7 structure. This dismantling will eliminate the threat of additional material releases and the safety hazard due to histoplasmosis. The activities in this removal action will include characterization, gross decontamination, removal, dismantling, packaging, and disposal and potential recycling of the materials making up the above-ground portion of the facility.

The FEMP submitted the draft Removal Action Work Plan (RAWP) to the U.S. EPA on April 20, and received comments from the Ohio and U.S. EPA comments on May 19 and June 1, 1993, respectively. The FEMP submitted the draft final RAWP on June 30. Ohio EPA granted conditional approval on July 12 with one additional comment, and U.S. EPA granted approval with no comments on July 30, 1993. The Ohio EPA's comment will be addressed and submitted via letter attachment. The RAWP will not be revised and resubmitted.

Phase I activities began in May 1993 and are being accomplished under the Safe Shutdown Program. Phase I activities continue and Phase II activities began on July 21, 1993. Phase I and II activities will continue through August.

The bid package went out to pre-qualified bidders on July 30, 1993. There will be a pre-bid meeting at the FEMP on August 9, with a walk-through of Plant 7.

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RA No. 19, Plant 7 Dismantling (continued)

KEY MILESTONES	STATUS	DUE DATE
Receive U.S. EPA comments	Completed on June 1, 1993	May 20, 1993
Submit Final Work Plan to the U.S. EPA	Completed on June 30, 1993	July 1, 1993

RA No. 21, Expedited Silo 3

The FEMP submitted the Expedited Silo 3 Removal Action Final Report to the U.S. EPA on February 24, 1993.

RA No. 22, Waste Pit Area Containment Improvement

Removal Action 22 was completed June 30, 1993. The FEMP is preparing a final report.

RA No. 24, Pilot Plant Sump

This sump is located on the southwest side of the Pilot Plant. The sump consists of a stainless steel cylinder approximately two feet in diameter and ten feet deep. This sump was built to remove liquids from the floor drains of the Pilot Plant and was used only during the renovation of the Pilot Plant in 1969. The sump is filled with a thick liquid and sludge. Analytical results of the sump contents show high concentrations of metals: lead, copper, chromium, nickel, as well as thorium and volatile organic compounds.

The FEMP has stopped monthly pump-outs of the sump in anticipation of the sump removal. The final pump-out will occur simultaneously with the sump removal.

The FEMP selected a subcontractor to perform the internal inspection of the drain line. Subcontractor personnel must complete site training before starting the inspection, and this training is being scheduled. The FEMP has received the cap to be used to close off the sump feed line after it is disconnected from the sump. This removal action is scheduled for completion by October 20, 1993.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

RA No. 24, Pilot Plant Sump (continued)

KEY MILESTONES	STATUS	DUE DATE
Perform Removal Preparations and Design	Open, behind schedule	May 24, 1993
Remove Sump, Evaluate Pipe Interior, Cap Inlet Pipe, Perform Soil Sampling	Open, ahead of schedule	September 22, 1993
Backfill Area and Return Area to Normal	Open, ahead of schedule	October 22, 1993

RA No. 25, Nitric Acid Tank Car and Area

The Nitric Acid Rail Car is located on the northern perimeter of the production area and east of Building 63. The FEMP RCRA Part A and Part B application identify this tank car and area surrounding it as a Hazardous Waste Management Unit.

This high-grade, stainless steel tank car has a capacity of approximately 100,000 gallons and measures approximately 10 feet wide by 40 feet long by 15 feet high. This unit operated from 1952 until about 1989. The tank car stored nitric acid used at the FEMP. Based on recent analysis, the tank car now contains 50-100 gallons of nitric acid. This removal action includes removing residual contents from the tank car followed by decontamination and disposal of the tank car.

The FEMP collected samples of the soil underneath and around the tank car in late July. Decontamination and dismantling of the tank car is scheduled for completion by September 4, 1993.

The Closure Plan Information Data was approved by the Ohio EPA on March 8, 1993. Closure activities must be completed by September 8, 1993.

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RA No. 25, Nitric Acid Tank Car and Area (continued)

KEY MILESTONES	STATUS	DUE DATE
Perform Removal Preparations and Design	Open, behind schedule	May 7, 1993
Sample, Transfer to (UNH) Tank, Decontaminate Tank Car, Perform Soil Sampling	Open, on schedule	September 7, 1993
Submit Final Report to DOE	Open, behind schedule	November 8, 1993

RA No. 26, Asbestos Removals (Asbestos Program)

This removal action documents asbestos abatement activity at the FEMP to mitigate the potential for contaminant release and migration. Abatements within the Asbestos Program to date include small-scale in-situ repairs, encasement, encapsulation, and removals, and the beginning (July, 1993) of large-scale asbestos abatement within Plant 7.

The June 1993 Work Procedures submittal included Large-Scale Asbestos Work Practices, which applies to all asbestos abatement on-site (both small- and large-scale). This submittal also provided generalizations of all abatement activities to date as well as planned abatement activities for the next year, including several large-scale abatement projects.

The FEMP is using the large-scale Asbestos Work Practices to perform the asbestos abatement activities associated with Removal Action 19, Plant 7 Dismantling. Asbestos work within Plant 7 is scheduled to continue through October, 1993.

KEY MILESTONES	**STATUS**	**DUE DATE**
Submit draft Work Procedures for 1993 to the U.S. EPA	Completed June 30, 1993	June 30, 1993

RA No. 27, Management of Contaminated Structures at the FEMP

This removal action was completed June 16, 1993.

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RA No. 28, Contamination at the Fire Training Facility

This removal action will address removal, decontamination and disposal, treatment or storage of all structures, tanks, equipment, the underground sump and oil/water separator, in addition to addressing "hot spots" soil staining, and any other surface soils from which a threat of migration of contamination exists.

The FEMP submitted the Removal Action Work Plan/Closure Plan Information and Data Package For Contamination at the Fire Training Facility to DOE on June 24, 1993. DOE submitted this document to the U.S. and Ohio EPAs on June 29, 1993.

KEY MILESTONES	STATUS	DUE DATE
Submit draft Work Plan to EPA	Completed on June 29, 1993	June 30, 1993

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Period Ending July 31, 1993

1.0 Operable Unit 1

Operable Unit 1, as defined in the Amended Consent Agreement, includes Waste Pits 1 - 6, Clearwell, Burn Pit, berms, liners, and soil within the operable unit boundary.

1.1 Treatability Studies

Scope:

The Operable Unit 1 treatability studies will evaluate several treatment process options identified in the Operable Unit 1 Initial Screening of Alternatives document: drying, agglomeration, polymer encapsulation, cement stabilization, and vitrification. The FEMP will evaluate the technical feasibility of these technologies through a series of experiments on both composite waste samples and individual strata samples. Where it is appropriate, the FEMP will investigate performance criteria, including formulation ranges, compressive strength, leachability, bulking factor, and permeability. Cement stabilization binding agents, including portland cement, flyash, Blast Furnace Slag, and sodium silicate, are being evaluated. Clay (attapulgite and clinoptilolite) will be added to reduce the leachability of metals in the waste. Glass formers and modifiers considered for vitrification are flyash, soil, and sodium hydroxide.

The stabilization testing consists of two phases. The preliminary phase, now complete, consisted of reagent range-finding experiments on a pit-by-pit basis using composite samples from individual waste pits. The advanced phase consists of testing on strata samples where available. Each phase contains two stages permitting additional reagent testing as necessary. An optional phase to evaluate waste form durability is also under consideration.

The FEMP will investigate a variety of drying methods including flash drying, rotary drying, and microwave drying. The FEMP will also test agglomeration of dried particles to reduce dusting, depending on the drying method and final particle size of the dried waste material. Polymer encapsulation will be studied using several types of low density polyethylene.

Status:

A Treatability Study Work Plan for drying, agglomeration, and polymer encapsulation, is being reviewed internally.

Treatability studies on drying and agglomeration have begun in onsite laboratories. Testing of polymer encapsulation is planned using surrogate materials at vendor test facilities.

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1.1 Treatability Studies (continued)

The FEMP shipped cement-stabilized samples for durability testing from IT to the University of Cincinnati.

Issues/Corrective Actions:

None to report.

1.2 Remedial Investigation

Scope:

The FEMP will prepare an RI Report in accordance with the U.S. EPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA Directive 93553-01) and the approved Risk Assessment Work Plan Addendum.

Status:

Internal DOE-FN review of Sections 1 through 4 of the Draft Operable Unit 1 RI Report was initiated on July 15, 1993.

Issues\Corrective Actions:

None to report.

OPERABLE UNIT 1 REMEDIAL INVESTIGATION REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants within the Operable Unit 1 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	10/12/93 C	12/11/93 C	01/10/94 C

C = Consent Agreement Date

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1.3 Feasibility Study

Scope:

The Feasibility Study evaluates remedial alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The Study analyzes remedial alternatives individually against each criterion and then compares them against one another to determine their respective strengths and weaknesses and to identify the key tradeoffs that must be balanced for the site.

Status:

A preliminary Statement of Work to obtain subcontractor technical support was prepared.

The Operable Unit 1 Feasibility Study team is currently completing detailed planning and is preparing the first draft of the FS for the November 9, 1993 submission to DOE-FN.

OPERABLE UNIT 1 FEASIBILITY STUDY

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	03/07/94 C	05/06/94 C	06/04/94 C

C = Consent Agreement Date A = Actual

1.4 Planned Activities for August 1993

- Work will continue on treatability studies for drying, agglomeration, and polymer encapsulation.
- Treatability Study Work Plan for drying, agglomeration, and polymer encapsulation will be completed and submitted for DOE-FN review.
- The Executive Summary, Sections 5, 6, 7, and Appendices A through E of the Draft Operable Unit 1 RI Report will be submitted for DOE review on August 16, 1993.
- A meeting will be held to resolve DOE-FN and DOE-HQ comments on Sections 1 through 4 of the draft Operable Unit 1 RI Report submitted in July.
- Fate and Transport modeling for the Baseline Risk Assessment will be completed.

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1.4 Planned Activities for August 1993 (continued)

- Work on the Operable Unit 1 CRARE will continue.
- The final draft of the Operable Unit 1 ARAR report will be completed.

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Period Ending July 31, 1993

2.0 Operable Unit 2

Operable Unit 2, as defined in the Amended Consent Agreement, includes the flyash piles, other South Field disposal areas, lime sludge ponds, solid waste landfill, berms, liners, and soil within the operable unit boundary.

2.1 Field Investigation

2.1.1 RI/FS Work Plan Addendum for Operable Unit 2

Scope:

DOE-FN submitted the Remedial Investigation RI Report for Operable Unit 2 to the U.S. EPA and Ohio EPA in October 1992. Based on December 17, 1992 review comments from the U.S. EPA and Ohio EPA on the RI Report and subsequent disapproval of the document, Operable Unit 2 will require a second phase of Remedial Investigation sampling and analysis in order to meet the objectives of the March 1988 Sitewide Remedial Investigation/Feasibility Study (RI/FS) Work Plan.

Status:

Collection and analysis of environmental samples is an integral part of the second phase of the Operable Unit 2 RI/FS. The FEMP prepared this additional Sampling and Analysis Plan in accordance with CERCLA Guidance for Conducting Remedial Investigations and Feasibility Studies.

FERMCO submitted the draft RI/FS Work Plan Addendum for Operable Unit 2 to DOE-FN on March 3, 1993. DOE-FN transmitted the Addendum to the Ohio EPA and U.S. EPA on March 8, 1993. Pursuant to the informal dispute resolution process with the U.S. EPA, the FEMP began field investigations on March 16, 1993.

South Field

All proposed field activities scheduled for the South Field have been completed and will not be updated in future reports.

Solid Waste Landfill

All proposed field activities scheduled for the Solid Waste Landfill have been completed and will not be updated in future reports.

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2.1 Field Investigation (continued)

Inactive Flyash Pile

All proposed field activities scheduled for the Inactive Flyash Pile have been completed and will not be updated in future reports.

Active Flyash Pile

All proposed field activities scheduled for the Active Flyash Pile have been completed and will not be updated in future reports.

Lime Sludge Ponds

All proposed field activities scheduled for the Lime Sludge Ponds have been completed and will not be updated in future reports.

Slug Tests

The FEMP completed slug tests for all wells except 1711, 1433, and 1941. These wells were not completed due to low water levels. However, 1433 and 1941 will be tested using a rising head test. 1711 will not be tested since the water level is too low for either test.

Issues/Corrective Actions:

None to report.

2.2 Feasibility Study

Status:

The revised schedule for the Operable Unit 2 RI/FS program has been evaluated through the informal dispute resolution and is now finalized.

Issues/Corrective Actions:

None to report.

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2.2 Feasibility Study (continued)

OPERABLE UNIT 2 FEASIBILITY STUDY REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Submit RI Report/Baseline Risk Assessment	02/18/94 C	04/15/94 C	05/13/94 C
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	04/29/94 C	06/27/94 C	07/25/94 C

C = Consent Agreement Date

2.3 Planned Activities for August 1993

- Complete slug tests on 9 monitoring wells.
- Complete K_d testing and recommence development of working level of PRGs.
- Continue 100 and 500 year flood plain study.
- Start evaluation of revised RI results as input to Feasibility Study.

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Period Ending July 31, 1993

3.0 Operable Unit 3

Operable Unit 3, as defined in the Amended Consent Agreement, includes the Production Area and production-associated facilities and equipment (including all above and below-grade improvements) including all structures, equipment, utilities, drums, tanks, solid waste, waste, product, thorium, effluent lines, K-65 transfer lines, wastewater treatment facilities, fire training facilities, scrap metal piles, feed stocks, and coal pile.

3.1 RI/FS Work Plan

Scope:

The RI/FS Work Plan will detail the approaches and assumptions to be applied to gathering information and the presenting results. Specifically, the Operable Unit 3 RI/FS Work Plan identifies the approach to be employed for baseline risk assessment and the specific sampling and sampling strategy to be performed during the field investigation program.

Status:

The Ohio EPA provided comments and granted conditional approval of the RI/FS Work Plan Addendum on February 16, 1993. In an April 14, 1993, letter, the U.S. EPA approved the revised Addendum, based on the comment-response package provided to the EPAs on March 19, 1993. The U.S. EPA approval stated, however, that the change proposed in the comment-response package must be incorporated into the Addendum, and a final version of the Addendum must be submitted to the U.S. EPA by May 15, 1993. DOE-FN transmitted the revised Addendum to the Ohio EPA and U.S. EPA on May 14, 1993. In a letter dated June 10, 1993, the U.S. EPA informed DOE that this final document failed to incorporate all of the proposed changes. The DOE provided responses to the concerns identified in U.S. EPA's letter on July 9, 1993.

Issues/Corrective Actions:

None to report.

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3.2 Field Investigation

Scope:

The Operable Unit 3 field investigation program will gather information necessary to perform a baseline risk assessment, further identify the nature of contaminants in the operable unit, refine estimates of volume of contaminated materials, and support initial screening of applicable alternatives.

Status:

The field screening for chemical and metals contamination began on July 6, 1993, using a portable X-Ray Fluorescence Analyzer and a Photo Ionization Detector. Screeners received training to perform this activity before July 6, and the FEMP issued 29 procedures for field screening and field sampling tools. The last procedure will be issued in August. The Training Department has written and approved lesson plans for 15 of these procedures, and the remaining 15 procedures are in development. The Readiness Review has been completed and accepted. The training on the Operable Unit 3 RI/FS Health and Safety Plan has been completed on chemical and rad screening personnel. The Management Self Assessment Program is in development. The first field screening self-Assessment was performed on July 27, 1993. The equipment storage room, located in Building 5E, is stocked, secured, and functioning. An inventory of the equipment is being performed. The Media Sampling personnel to be assigned to Operable Unit 3 have been identified and are being evaluated by Medical for weight-lifting requirements and respirator fitness.

Issues/Corrective Actions:

Intrusive media sampling will begin on September 7. Contract laboratory availability is critical to beginning training on the intrusive media samplers. Failure to obtain the pending contract laboratory capacity for chemical and radiological sample analysis will delay training and will, therefore, delay intrusive sampling beyond the September 7 start date.

3.3 Treatability Studies

Scope:

The treatability studies gather information necessary to support remedy selection, engineering, and implementation. Specific studies will be structured to gather the information necessary for specific technologies identified through screening as part of leading alternatives.

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3.3 Treatability Studies (continued)

Status:

Formal identification of treatability studies for Operable Unit 3 has not been undertaken; however, the FEMP will conduct remedy screening treatability studies in parallel with the Field Investigation and Alternatives development. Operable Unit 3 is developing a Treatability Study Work Plan to include initially-identified studies to be performed. Current actions involve the Screening of Alternatives to identify needed studies. The plan is scheduled to be complete to meet a January 15, 1994 due date to the EPA.

Issues/Corrective Actions:

None to report.

3.4 Remedial Investigation Report

Scope:

The Remedial Investigation Report provides a summary of the field investigations and supports the Feasibility Study by defining the nature and extent of the contaminants in Operable Unit 3, estimating the volume of contaminated media and materials, and providing a baseline risk assessment which establishes remedial action objectives.

Status:

With the exception of planning the report content and layout, formal development of the RI has not begun.

3.5 Feasibility Study

Scope:

The Feasibility Study evaluates alternatives in detail with respect to the nine U.S. EPA evaluation criteria. The FEMP analyzes the alternatives individually and then compares to one another to determine respective strengths and weaknesses and to identify key tradeoffs. The Feasibility Study also includes an overall assessment of site residual risks through a Comprehensive Response Action Risk Evaluation.

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Period Ending July 31, 1993

Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398705
Cincinnati, Ohio 45239-8705

Location: 1I000004002
002 Discharge (Overflow) to Storm Sewer Outfall Ditch
Stormwater Retention Basin Spillway (Effluent to Paddy's Run)

Month: June 1993

There was no discharge to Paddy's Run from the Stormwater Retention Basin.

Based on 1.75 inches of rainfall for the month, the uranium discharge to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 4.97 kgs.

3.5 Feasibility Study (continued)

Status:

Operable Unit 3 has not begun formal activities on the Feasibility Study, although alternatives research and document layout planning are underway. As a result of the development of a Proposed Plan for Interim Action, the Feasibility Study will not address initial decontamination or dismantling, but will focus on treatment and disposal issues, which remain the scope of the final action.

Issues/Corrective Actions:

None to report.

3.6 Planned Activities for August 1993

- Prepare test-specific work plans for initially identified Treatability Studies as part of the Treatability Study Work Plan.
- Submit Proposed Plan document for U.S. EPA review. This will achieve an interim Record of Decision for decontamination and dismantling of components for Operable Unit 3.
- Refine task descriptions/assignments, identify group coordinators and task leaders, identify other needed resources, and begin developing the Remedial Design/Remedial Action Work Plan for the Proposed Plan for Interim Action.
- Continue writing of Field Work Packages; continue radiological screening to support the Field Work Packages.
- Continue field screening using the X-Ray Fluorescence Analyzer and a Photo Ionization Detector; select locations for intrusive media samples based on screening results; continue rad screening to determine rad intrusive media locations.
- Complete and issue the lesson plans for all 30 Operable Unit 3 RI/FS procedures through the Training Department.

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3.6 Planned Activities for August 1993 (continued)

- Complete the Management Self-Assessment Program, and implement the Program by late August.

- Assign Media Sampling personnel to the Operable Unit 3 RI/FS Sampling Program on August 23; begin training on the sampling procedures on August 23; present the Operable Unit 3 RI/FS Health and Safety Plan training to the media sampling personnel.

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4.0 Operable Unit 4

Operable Unit 4, as defined in the Amended Consent Agreement, consists of Silos 1, 2, 3, and 4, the silo berms, the Decant Sump Tank System, and soil within the operable unit boundary.

4.1 Field Investigation (Sampling West of K-65 Silos 1 and 2)

Scope:

The information obtained through this additional investigation will augment the current understanding and conclusions drawn from previous sampling and analytical results which have been used to characterize the extent of contamination in the vadose zone and groundwater in the glacial overburden immediately west of the K-65 Silos 1 and 2. Two 1000-series piezometers were installed in the uppermost perched water interval in the K-65 Silos area. One lysimeter targeted the perched water zone downgradient of the Decant Sump Tank. Three lysimeters were installed in the east bank of Paddy's Run to verify that contamination from the vadose zone or perched water is not entering the stream.

Status:

As of July 30, 1993, all samples required by the Work Addendum have been collected with the exception of the groundwater sample from the Contingency Well MW-11207. Presently the analytical results are not available for these samples.

Attempts to sample ME 11207 were unsuccessful as the well is currently dry. Water levels of piezometers and monitor wells in the study will continue to be monitored. If the water level in MW 11207 increases groundwater samples will be collected.

Issues/Concerns

Data from this sampling program will be incorporated into the Operable Unit 5 RI report and into the USEPA submittal of the Operable Unit 4 FS.

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4.2 Treatability Studies

Scope:

A Treatability Study Work Plan addresses the additional information that is required to support the FS and subsequent remedy selection for Operable Unit 4. There are two separate treatability studies to support the Operable Unit 4 FS. One study considers cement stabilization of Silos 1, 2, and 3 material and chemical extraction, leachate precipitation, and leachate stabilization of Silos 1 and 2 material. The second treatability study considers the vitrification of Silos 1, 2, and 3 material.

Status:

The results from the Vitrification studies, the Cement Stabilization Preliminary and Advanced Phase Tests, and the Chemical Extraction test have been summarized and incorporated in appendix C of the Operable Unit 4 Feasibility Study.

The Cement Stabilization Optional Phase Treatability testing report has been completed and is included in the Operable Unit 4 Feasibility Study as appendix H.

Issues/Corrective Actions:

None

4.3 Remedial Investigation Report

Scope:

The RI provides a summary of the field investigations and supports the FS by defining the nature and extent of the contaminants in the Operable Unit 4 study area, estimating the volume of contaminated media and materials, and providing a baseline risk assessment which establishes remedial action objectives.

Status:

USEPA comments on the Operable Unit 4 RI Report have been incorporated into the draft final report. Due to the large number of comments, a 20 day extension for submittal to USEPA was requested and has been granted. The revised Remedial Investigation Report is anticipated to be submitted to the USEPA on August 12, 1993. The draft Operable Unit 4 RI comment response document was submitted to USEPA on July 23, 1993. The final comment response document will be submitted with the RI.

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4.3 Remedial Investigation Report (continued)

OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Details the nature and extent of contaminants in the Operable Unit 4 study area. Estimates the volume of contaminated media and materials. Provides a baseline risk assessment and establishes remedial action objectives.	04/19/93 A	06/18/93 C 06/24/93 A	08/12/93 C

C = Consent Agreement Date
A = Actual Date

4.4 Feasibility Study

Scope:

The FS evaluates remedial alternatives in detail with respect to the nine evaluation criteria developed by the U.S. EPA. The remedial alternatives are analyzed individually against each criterion and then compared against one another to determine their respective strengths and weaknesses, and to identify the key tradeoffs that must be balanced for the site.

Status:

Comments on the Operable Unit 4 Feasibility Study were received from DOE-HQ on July 9, 1993. These comments have been incorporated and a revised FS was transmitted to DOE-HQ on August 4, 1993. The Feasibility Study is on schedule for submission to the U.S. EPA on September 10, 1993.

Issues/Corrective Actions:

The Operable Unit 4 Feasibility Study will contain the first site-wide integrated FS/EIS and also the first sitewide CRARE. Presentation of the required technical information and integration with the RI/FS guidance for both documents are priority issues.

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4.4 Feasibility Study (continued)

OPERABLE UNIT 4 FEASIBILITY STUDY **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Describes and analyzes potential remedial alternatives. A comparative analysis is performed for all alternatives.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

4.5 Proposed Plan

Scope:

The Proposed Plan identifies the remedial alternatives being considered for the remediation of Operable Unit 4 in the Feasibility Study for Operable Unit 4. The preferred alternative and the reasons for its selection will also be presented. The DOE and the U.S. EPA will solicit public comments on the alternatives presented including the preferred alternative.

Status:

Comments on the Operable Unit 4 proposed plan were received from DOE-HQ on July 9, 1993. These comments have been incorporated and the revised Proposed Plan was transmitted to DOE-HQ on August 4, 1993. The Proposed Plan is on schedule for submission to the U.S. EPA on September 10, 1993.

Issues/Corrective Actions:

None

OPERABLE UNIT 4 PROPOSED PLAN **PRIMARY**

SCOPE	SUBMIT TO EPA	RECEIVE FROM EPA	SUBMIT TO EPA FINAL
Identifies potential remedial alternatives as listed in the FS and presents the preferred alternative to the U.S EPA and the public.	09/10/93 C	11/10/93 C	12/09/93 C

C = Consent Agreement Date

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4.6 Planned Activities for August 1993

- Complete the response to the U.S EPA comments on the Operable Unit 4 Remedial Investigation Report.
- Complete the Revised Operable Unit 4 Remedial Investigation Report based on the U.S. EPA comments.
- Begin revisions to the FS/EIS/PP based on comments received from DOE-FN and DOE-HQ.
- Begin revisions to the internal review of the draft Cement Stabilization Optional Phase Treatability Study Report.
- Prepare the Operable Unit 4 Remedial Investigation Report supporting documents for the inclusion in the Administrative Record.
- Prepare the outline for the Record of Decision for internal review.
- Continue to monitor water levels for MW 11207

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

5.0 Operable Unit 5

Operable Unit 5, as defined in the Amended Consent Agreement, includes: groundwater, surface water, soil not included in the definitions of Operable Units 1 - 4, sediments, flora, and fauna.

5.1 Field Investigation

5.1.1 Operable Unit 5 Work Plan Addenda

Scope:

Soil and perched groundwater sampling was conducted in the following areas under this program: the Plant 1 Pad, the Southeast Quadrant of the Production Area, the Fire Training Area, the KC-2 Warehouse Area, Scrap Metal Area and Electrical Substation, and the K-65 Slurry Line and Clearwell Line.

Status:

On November 30, 1992, conditional approval was received from the Ohio EPA to proceed with the field investigations. On December 2, 1992, the U.S. EPA also provided conditional approval of the Work Plan. Conditional approval from both agencies was based on the necessity to respond to specific comments which appear minor. It was determined in January 1993 to initiate field investigations for the KC-2 Warehouse Area even though comments from the regulators indicated concerns and issues that require further resolution.

The responses to the additional comments from the Ohio EPA and U.S. EPA are completed and transmitted to the EPAs. The Work Plan Addenda will be revised once final comment resolutions have been achieved with the regulatory agencies.

Nearly all the field work for this task has been completed. Remaining work is scheduled to be completed by October 1, 1993.

5.1.2 Additional Operable Unit 5 Field Investigation Tasks

The scope and rationale for the following site characterization programs were presented to DOE-FN, DOE-HQ, U.S. EPA, and Ohio EPA at Technical Information Exchange Meetings on April 1 and April 20, 1993:

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5.1.2 Additional Operable Unit 5 Field Investigation Tasks (continued)

- FEMP Trap Shooting Range Investigation
- Great Miami Riverbank Investigation
- Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation
- Surface and Subsurface Soil Sampling
- Additional Monitoring Well Installation and Well Abandonment
- Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling
- FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation.

The draft Project Specific Plans (PSPs) for these programs have been completed and submitted to DOE and EPA. U.S. EPA and Ohio EPA comments have been received on six of the seven PSPs. For the Trap Shooting Range Investigation, only Ohio EPA comments were received. The comments are being addressed and responses will be transmitted to the agencies in August. Arrangements are being made for a comment resolution meeting on August 26, 1993.

Status:

FEMP Trap Shooting Range Investigation

Field work for this task was completed in July. Soil samples are currently undergoing sieve analysis at the on-site laboratory. Based on the results of the sieve analysis, samples will be submitted to a RI/FS contract laboratory for more detailed analysis as specified in the Work Plan.

Great Miami River Bank Investigation

Nine of the scheduled eighteen soil borings were completed for this task. The remaining nine borings will be completed in August.

Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation

Sampling specified in the PSP was completed in June. Daily flow measurements at two weirs and a drainage pipe in this area were completed in mid-July. The flow data is currently being evaluated to further quantify the variability of the components to the flow in the ditch.

5.1.2 Additional Operable Unit 5 Field Investigation Tasks (continued)

Surface and Subsurface Soil Sampling

The FEMP has staked and surveyed 60 shallow soil locations (0-0.5 feet) outside the former Production Area, and 57 of the shallow soil locations have been sampled. Three off-site locations remain to be sampled pending completion of access agreements, which will be complete in early August. Sampling of the former production area sample locations began on July 8. The FEMP has completed all 14 Production Area hand auger locations and all 10 five-foot deep auger borings as of July 30. Of 25 deep auger borings, 19 have been completed as of August 6. The boring program west of the K-65 silos began on July 8. As of August 6, 30 out of 37 six-foot borings have been completed. Four borings were added to this program based on the radiological walk-over survey.

Additional Monitoring Well Installation and Well Abandonment

The FEMP has installed 20 new wells originally planned for this program. Installation has begun on two of the five additional wells in the Waste Storage Area. Table 5-1 depicts the installation, development, and sampling activities associated with the new wells.

Seven wells (1350, 1174, 1004, 1072, 1030, 1037, and 3084) are scheduled to be plugged and abandoned for this task. This work is expected to begin in August 1993.

Snapshot Monitoring Well Sampling and Surface Water/Sediment Sampling

The FEMP has sampled all original snapshot monitoring wells capable of yielding sufficient water for sampling. All surface water and sediment sampling has been completed.

FEMP Glacial Overburden/Vadose Zone Hydraulic Investigation

Procuring equipment and completing the drilling contract for this task have contributed to a significant delay in this program. Further delays may be encountered in the yield test and potential pump test in the vicinity of Plant 2/3 due to the Plant 8 perched water VOC treatment system being shut down. All operations in Plant 8 have been shut down due to the UNH spill that occurred earlier this year. Current projections indicate Plant 8 operations will continue in September.

Approximately 40 of the 78 scheduled slug tests have been completed. Three of the five planned yield tests have been completed. The pump tests, packer tests and lysimeter installations are scheduled to be completed by early September.

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5.1.3 Abandonment and Plugging of KC-2 Warehouse Well No. 67

Attempts to clean out Well No. 67 began on July 1, 1993. After several days of drilling and bailing, only twelve feet of the expected forty feet of sediments were removed. Material removed from this twelve feet consisted of wood fragments, pieces of metal and sediment. Sediment samples were to be collected to characterize every ten feet of the sediment column. Because the drillers were only able to advance twelve feet, only the first ten-foot interval of the sediment column was sampled.

Several days were spent attempting to progress past the 190-foot depth. A magnet and breaker bit were used in an attempt to remove more of the suspected metal pieces from the hole. On July 13, 1993, a sediment sample was collected for an on-site analysis for total uranium content. The drillers were unable to advance the removal effort beyond the 190-foot depth interval. A camera survey was then utilized to determine the condition of the casing and to see if an obstruction was visible. Results of the camera survey showed the casing to be in good condition down to a depth of 184 feet. Turbidity of the water prevented deeper examination of the well casing. Attempts were then made to loosen the sediment with a jetting tool, and then remove it with a sand pump or sand bailer. Before the jetting process was begun, water samples were collected from the well for on-site analysis of total uranium (filtered and non-filtered).

On July 23, 1993, the FEMP used the jetting tool to penetrate and loosen the sediment in the well casing. The drillers were able to advance the jetting tool into the sediment approximately three feet. The drillers noted that hard material was present in the sediment and that the jetting tool was being deflected by this material. The drillers made several attempts to remove the sediment with a sand pump and a bailer after the jetting process. Small amounts of material were recovered from the well. Depth to the top of the sediment column was measured at 191 feet from the top of the casing.

It was determined that it would be futile to continue the current methods being used to clean out the well. The project has been halted until analytical results are available. When the results are available, the FEMP will confer with the EPAs to determine the most appropriate path forward for this removal action. DOE-FN has prepared a draft letter to DOE-HQ on this project status.

Issues/Corrective Actions:

None to report.

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5.2 Treatability Study

Scope:

The Treatability Study provides information to support the Feasibility Study and subsequent remedy selection for Operable Unit 5. Specifically, the study will demonstrate the feasibility of soil washing as a remedial technology for cleaning soil in Operable Unit 5. The study incorporates a physical separation/chemical extraction process that initially involves separating a soil into different particle-size fractions. The process uses reagent formulas in the washing solutions to extract radionuclides and organic and inorganic compounds from these different-size fractions. The contaminants may be separated from the wash stream into a concentrated residue for further treatment. The study consists of two phases: (1) remedy screening Stages 1 and 2, involving laboratory and bench-scale tests; and (2) remedy selection using pilot-scale equipment. Soils from three different areas will be used in these investigations. These soils are from the following areas: incinerator area (ID-A), Plant 1 Pad Area (ID-B), and maintenance building area (OU5-A).

Status:

The FEMP installed the skids containing the major portion of the soil washing pilot plant equipment in April 1993. During May, The FEMP made modifications/ additions to address safety issues were addressed, and then installed the centrifuge, which is the last major piece of equipment. The FEMP trained supervisors and technicians for the operation of the pilot plant. Documents completed in support of startup of the soil washing pilot plant included the health and safety plan, environmental compliance plan and the risk management plan.

IT Corporation submitted the data from the remedy screening tests for the ID-A and ID-B soils on April 12, 1993. The data from the OU5-A soil was received in the middle of May. The FEMP is preparing a summary report of the data. Results from these bench-scale studies were used to provide the initial operating conditions for startup of the remedy selection soil washing pilot plant. Initial operating conditions include physical separation processes followed by chemical extraction with dilute inorganic acid at elevated temperatures. The test system is designed to include spent extractant treatment.

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5.2 Treatability Study (continued)

The soil washing pilot plant began processing radiologically contaminated ID-B soil on June 8. A second run of soils from the incinerator area was subsequently completed. Results from the initial sample analysis performed in the FERMCO onsite laboratory were summarized and the mass balance calculated. FERMCO is preparing an evaluation of the data. This satisfies the requirement in the Operable Unit 5 Soil Washing Treatability Work Plan for completion of Stage I and Stage II work. Additional bench scale work is being considered to support the remedy selection.

A soil treatability laboratory is currently being established at Fernald to support pilot plant testing and further bench testing of other reagents. Government-owned laboratory and testing equipment from IT's ETDC facility in Oak Ridge has been shipped to Fernald for installation in the on-site lab.

The FEMP began design and programming of a database to accommodate Operable Unit 5 remedy screening and remedy selection data. The database is being designed to also accommodate soil washing treatability test data from Lockheed Environmental and Oak Ridge National Laboratory. These soil washing test programs have been conducted in parallel to the Operable Unit 5 study under the umbrella of the DOE Treatability Integrated Demonstration program.

5.3 Operable Unit 2 Dispute Resolution Supplemental Project (Uranium Reduction in FEMP Discharge)

Scope:

The supplemental project will provide for partial treatment of the South Plume discharge with the objective of reducing uranium discharges from the FEMP to the Great Miami River. The project consists of the following parts:

1. Procure and install one additional IAWWT trailer unit to treat 200 gpm South Plume flow. This new unit, referred to as the South Plume Interim Treatment (SPIT) project, will be installed by March 30, 1994.
2. Use off-peak capacity in Phase I AWWT for South Plume Treatment when no stormwater is available for treatment. This provision will be available in January 1995 when Phase I of the AWWT becomes operational.

5.3 Operable Unit 2 Dispute Resolution Supplemental Project (Uranium Reduction in FEMP Discharge) (continued)

3. Eliminate low uranium streams, that is, less than 20 ppb (Sewage Treatment Plant and clean side General Sump) from Phase II AWWT and utilize this capacity to treat a portion of the South Plume; estimated to be approximately 200 gpm. This provision will be available in January 1995 when Phase II of the AWWT becomes operational.

4. Extend the planned operational life of the existing IAWWT SWRB unit and convert from treating stormwater to treating South Plume flow. Also, the capacity would be increased from 300 gpm to approximately 400 gpm. This would be accomplished by March 30, 1995.

Status:

Part 1

The Architect/Engineer (A/E) has completed the 90% review of the Design Basis Document, sketches, and specifications. These items will be used in the procurement package for the unit. Review comments received on this 90% design package have caused the A/E to pursue Detailed Design of several supporting components. The A/E's efforts are scheduled for completion by July 27, 1993, but resolving comments will delay completion of this package until August 27. The procurement package will be issued shortly thereafter.

Part 2

The FEMP is evaluating the best method for transferring South Plume water to Part 2. Preliminary thinking is to run a parallel main from the existing valve house to the AWWT Phase II unit. This would be installed in the same trench as the planned 10 inch line from the valve house to Phase I. The 10 inch line will transfer SWRB discharge (or Part 3 South Plume flow) to Phase I.

Part 3

Operable Unit 5 has completed changes to the AWWT project scope to eliminate the treatment of the Sewage Treatment Plant and clean side General Sump flows. The AWWT package now under construction contains piping and valving to transfer South Plume flow to the existing SWRB pumping station for subsequent transfer to Phase II.

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5.4 Remedial Investigation

Scope:

The Remedial Investigation is the mechanism for collecting data to characterize site conditions, determining the nature of the Site's wastes, determining the nature and extent of contamination, and assessing baseline risk to human health and the environment.

Status:

Remedial Investigation data compilation and evaluation continues. All data sources to be included are being identified and evaluated. Chemical and radiological data collected as part of both the RI/FS and other site sampling programs are being posted on maps and evaluated. The FEMP is compiling, evaluating, and updating the geologic and hydrogeologic information contained in RI/FS site files and documents. Existing maps and cross sections are being updated where additional information has become available. New maps and cross sections of the glacial overburden have been and continue to be generated. The FEMP is now reviewing the preliminary versions of Sections 1, 2, and 3 of the Remedial Investigation Report.

The FEMP began a significant data validation effort in January, and it became fully operational in February. The effort identified and validation a backlog of nearly 8,000 RI/FS samples requiring validation. Validation of the backlog samples was completed in June. QC and formatting of the validated data base is continuing. The validated data base will be transferred to Operable Unit 5 in early August. Operable Unit 5 staff will begin to split up the validated data base so that work can begin on Sections 4, 5 and 6 of the Remedial Investigation report. Additional validated data will be added to the data base throughout this summer and fall as validation is completed on supplemental data from non-RI/FS programs, new programs, and laboratory data that has been received since the beginning of 1993.

The FEMP prepared responses to U.S. EPA and Ohio EPA comments on the Groundwater and Surface Water Background report, and these comments are currently undergoing internal review. DOE-FN will transmit the responses to the EPAs in August. Work on preparing an ecological risk screening study based on U.S. EPA Region V guidelines continues. Completion of the screening study is expected in August and will be forwarded to the EPAs.

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5.4 Remedial Investigation (continued)

Issues/Corrective Actions:

Attenuation/release characteristics of uranium contamination at the FEMP are an issue that has not been resolved in RI/FS studies to date. DOE is developing a site-wide strategy for addressing the attenuation/release characteristics of uranium. In addition to summarizing all the existing information from previous studies (i.e., EWMF and soil washing treatability studies), this strategy will determine the overall approach and necessary laboratory experiments to define the following data:

- Extractable portions of uranium in the waste materials;
- K_d values for the waste materials based on the total contaminant mass or the extractable mass only; and
- Aerial and vertical distributions of K_d values for contaminants in the media outside the contaminant source areas.

Preliminary experimental procedures have been developed and waste materials have been collected from the Operable Unit 2 waste units. The first batch of experiments began in late June. After these results are available (by mid-July), the procedure and the overall plan will be re-evaluated and completed. Before this information is available, conservative assumptions and literature values will be used for RI/FS activities (i.e., Operable Unit 4 and Operable Unit 1 RI/FS and CRARE).

5.5 Planned Activities for August 1993

- Complete field work for all of the Remedial Investigation characterization programs in progress with the exception of the Glacial Overburden/Vadose Zone Hydraulic Investigation.

- Resolve all U.S. EPA, Ohio EPA, and internal comments related to the present field programs.

- Complete the site strategy on determining attenuation/release characteristics for uranium. Present this strategy to the EPAs.

- Continue work on Remedial Investigation report Sections 1, 2, and 3. Continue compiling and evaluating historic data in support of the Report.

- Complete screening study for ecological risk assessment and transmit report to EPA.

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5.5 Planned Activities for August 1993 (continued)

- Continue validation of the laboratory data from the present field programs and from supplemental non-RI/FS programs.
- Divide the validated data base by media so that work can begin on Sections 4, 5, and 6 of the Remedial Investigation report.
- Begin work on Sections 4, 5, and 6 of the Remedial Investigation report.
- Respond to EPA comments on the following reports that were submitted to the agencies in May: "Characterization of Background Water Quality for Streams and Groundwater"; "Groundwater Modeling Evaluation Report and Improvement Plan"; and "Groundwater Modeling Report - Summary of Model Development."
- Meet with U.S. EPA and Ohio EPA to resolve outstanding comments on all Operable Unit 5 Remedial Investigation site characterization programs.
- Complete sampling specified in the Operable Unit 5 Work Plan Addenda.
- Revise the Operable Unit 5 Work Plan Addenda to reflect final comment resolutions.
- Complete comment responses to the Ohio EPA and U.S. EPA comments on the Work Plan Addendum for the Outfall Line. Revise the Work Plan to reflect final comment resolutions.
- Meet with U.S. EPA and Ohio EPA to provide them with the status and findings of the new field programs.
- Confer with the EPAs to determine the path forward for the KC-2 Warehouse Well No. 67 Removal Action.

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6.0 On-Site Disposal Cell

The Engineered Waste Management Facility (EWMF) scope has been modified to evaluate the On-Site Disposal Cell (OSDC) alternatives along with the complete evaluation of off-site alternatives. All further reference to the EWMF will be entitled OSDC.

The technical approach for the evaluation will be based on a information previously developed for the EWMF. This information is being expanded to include the development of engineering assessment to evaluate the On-Site Disposal/Storage, Off-Site Disposal, and Transportation Risk Assessment for Off-Site Disposal. The information generated by these technical reports and the reports that will be generated from the information gathered for the EWMF Siting Report will serve as a basis for evaluating the disposal options and alternatives.

6.1 EWMF General Siting Report

Scope:

The EWMF Siting Report was meant to evaluate the feasibility of locating an EWMF facility at the FEMP. The intent was to deliver all of the information necessary to meet the requirements in a singular document. In order to expedite the delivery of the technical information, the report has been subdivided into the following six stand-alone technical reports:

Geotechnical Engineering Analysis for an On-Site Disposal Cell

This report will contain the engineering analysis prepared for the EWMF structure. This will include an analysis of the barrier and cap design, drainage system, erosion analysis, slope stability analysis and an estimated cost of construction for an on-site tumulus. The report will be entitled, "Technical Report 5.1A, Engineering Evaluation Report for On-Site Disposal".

Site Characterization Report

This report will include the investigation and evaluation of the site geology, radiation measurements, well installation diagrams, boring logs, and analytical data. This report will be entitled "Technical Report 5.1B, Site Characterization/Geological Report for On-Site Disposal."

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6.1 EWMF General Siting Report (continued)

Material Source Survey

This report will discuss the availability and cost of materials in the local area required to construct the OSDC. This report will be entitled "Technical Report 5.1C, Material Source Survey for On-Site Disposal."

ARARs Report

This report will identify and discuss the ARARs that will be applicable to the construction of an OSDC. This report will be entitled "Technical Report 5.4, ARARs for On-Site Disposal Cell Concept".

Survey of Local Geology in the Alternate Siting Areas

This report will cover the investigation of two alternative sites for the OSDC adjacent or near the FEMP situated on bedrock highs. The two sites to be evaluated are the Girl Scout Camp and another located west of the FEMP. The report will be entitled, "Technical Report 5.3A, Geological Report for Off-Site Disposal".

Ecological Characterization

This report will discuss the ecological characterization of the two off-site locations. The two sites to be evaluated are the Girl Scout Camp and another located west of the FEMP. The report will be entitled, "Technical Report 5.3B, Ecological Characterization of the Off-Property Disposal Cell Study Area".

Status:

The FEMP awarded a contract to IT Corporation to complete the six technical reports, and all six technical reports have been received. The risk-based evaluation of an onsite disposal cell containing treated wastes has been delayed pending further review.

Issues/Corrective Actions:

None to report.

6.2 Planned Activities for July 1993

None to report.

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7.0 Community Relations

Status:

On July 7, local newspapers published three Notices of Availability for removal actions at the FEMP, opening 30-day public comment periods on each. Two removal actions are in Operable Unit 3: Asbestos Abatement Program and Contamination at the Fire Training Facility. One is in Operable Unit 5: KC-2 Warehouse/Well Number 67. Ken Morgan, DOE-FN will receive all comments from the public. After the comment periods, FERMCO will prepare an addendum to the Community Relations Plan for each removal action.

On July 8, DOE-FN conducted a public meeting to gather input from stakeholders on the workforce restructuring program. Approximately 30 stakeholders attended the meeting at the Plantation in Harrison, Ohio. The stakeholders provided DOE with diverse opinions, which DOE will consider and use to make recommendations to FERMCO for inclusion in the restructuring program.

On July 9, Ohio Congressman Rob Portman toured the site. On July 19 U.S. Rep. Portman met with DOE-FN officials and members of Fernald Residents for Environment, Safety, and Health (FRESH).

Public Affairs staff continues to support Dr. Eula Bingham, the convener of the Fernald Advisory Committee. DOE-FN sponsored a public work session on July 14 at the Meadowbrook in Ross, Ohio. About 40 people attended, including Jim Saric from U.S. EPA Region V and Graham Mitchell from the Ohio EPA. Dr. Bingham discussed the committee's charter and membership representation. After Dr. Bingham has nominated a list of people willing to serve on the committee, it will meet to address issues such as future use of the site, cleanup levels, and waste disposal. The first meeting of the advisory committee is expected to be in late August or early September.

DOE-FN has prepared a draft Fernald Public Involvement Program. Representatives of the field office presented the document at the DOE EM-4, Office of Policy and Program Information, quarterly meeting in San Francisco on July 13-15. Developing a sitewide plan will help coordinate public involvement activities and increase public involvement in an efficient and effective manner. Through this program, technical managers can meet their responsibility for factoring public values and concerns into decision making.

Two removal actions (Erosion Control at the Inactive Flyash Pile and Plant 7 Dismantling) completed public comment periods in July. The FEMP did not received comments from the public. In accordance with the RI/FS Community Relations Plan, an addendum to the CRP is being prepared for each.

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7.0 Community Relations (continued)

DOE-FN representatives attended the monthly FRESH meeting, held July 22, 1993. Fifteen members of the community attended the meeting. Topics included:

- Status of the Fernald Advisory Committee
- Feedback from the July 20 Restructuring Meeting
- Plant 1 ore silos update
- Upcoming Minimum Additive Waste Stabilization (MAWS) demonstration at the site

FERMCO Public Affairs gave a presentation on the Science, Technology, the Environment and the Public (STEP) program. The STEP program is designed to be "gateway to participation" for local residents and other stakeholders interested in Fernald activities.

Issues/Corrective Action

None.

Planned Activities for August 1993

DOE sites prepare annual planning documents, of which one is called the Roadmap, for DOE-HQ to use in developing budgets and resolving issues. Fernald is preparing its Roadmap and will be mailing information to interested members of the public in mid-August. The public will be asked to help DOE frame issues relating to environmental restoration that need resolution at DOE-HQ. The issues include the future use of the site, transportation, storage of waste, and cleanup objectives.

Public comment periods on three removal actions conclude August 9.

The Operable Unit 3 Proposed Plan/Environmental Assessment for Interim Remedial Action went to U.S. EPA on August 16.

DOE-HQ is conducting a workshop on technology for community leaders from various DOE sites across the country. This year's workshop will be August 16-18 in Augusta, GA. Five Fernald-area community members have been invited to attend.

FERMCO will submit the Operable Unit 4 Remedial Investigation Responsiveness Summary to U.S. EPA in mid-August.

The monthly FRESH meeting is scheduled for August 26.

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PERIOD ENDING JULY 31, 1993

ENCLOSURE A

WASTEWATER FLOWS AND RADIONUCLIDE CONCENTRATIONS UNDER CA SECTION XXIII.B

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Period Ending July 31, 1993

Introduction

The accompanying Effluent Radiation Reports provide, in accordance with the requirements of Section XXIII.B of the Consent Agreement As Amended under CERCLA Sections 120 and 106 (a), data on the daily wastewater flows, radionuclide concentrations, and loadings released to the Great Miami River and an estimate of runoff and radionuclide concentrations to Paddy's Run during June 1993.

Summary - June 1993

The total quantity of uranium discharged from the FEMP to the Great Miami River via Manhole 175 (Outfall 1I000004001) was 15.18 kilograms. The average uranium concentration for the previous 12 months was 0.60 mg/L. This is 67.4% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

There was no discharge from the Stormwater Retention Basin (Outfall 1I000004002) to Paddy's Run via the Storm Sewer Outfall Ditch in June 1993. Based on 1.75 inches of rainfall in June 1993, the total quantity of uranium discharged to Paddy's Run from uncontrolled areas of the FEMP is estimated to be 4.97 kilograms.

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Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398705
Cincinnati, Ohio 45239-8705

Location: 1I000004001 Month: June 1993
001 Total Discharge
Manhole 175 (Effluent to the Great Miami River)

Day	Flow (MGD)	Total Alpha (pCi/L)	Total Beta (pCi/L)	Total U (mg/L)	Total U (kgs)	Calculated Total U-238 (pCi/L) (1)
1	0.375	27	104	0.04	0.06	14
2	0.410	68	140	0.07	0.11	24
3	1.302	266	68	0.40	1.97	135
4	1.406	248	140	0.33	1.76	111
5	0.949	221	104	0.35	1.26	118
6	0.400	99	257	0.13	0.20	44
7	0.485	72	275	0.13	0.24	44
8	0.413	5	50	0.02	0.03	7
9	0.435	104	171	0.19	0.31	64
10	0.330	225	171	0.39	0.49	132
11	0.344	45	68	0.05	0.07	17
12	1.556	2007	126	0.28	1.65	95
13	1.500	198	86	0.30	1.70	101
14	1.530	221	108	0.28	1.62	95
15	1.566	212	104	0.31	1.84	105
16	0.749	252	149	0.21	0.60	71
17	0.256	81	86	0.04	0.04	14
18	0.242	36	59	0.03	0.03	10
19	0.362	90	104	0.10	0.14	34
20	0.295	108	171	0.20	0.22	68
21	0.334	36	68	0.02	0.03	7
22	0.296	86	36	0.08	0.09	27
23	0.326	45	153	0.07	0.09	24
24	0.219	59	126	0.09	0.07	30
25	0.251	*	*	0.07	0.07	24
26	0.305	203	185	0.15	0.17	51
27	0.311	*	*	0.01	0.01	3
28	0.390	*	*	0.06	0.09	20
29	0.544	*	*	0.05	0.10	17
30	0.488	*	*	0.05	0.09	17
31	0.317	*	*	0.05	0.06	17
TOTAL	18.695				15.18	

* Analytical results not yet approved.

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Period Ending July 31, 1993

Wastewater Flows and Radionuclide Concentrations

Facility: Fernald Environmental Management Project

Location: 001 Total Discharge

Month June 1993

	Flow (MGD)	Total Alpha (pCi/L)(2)	Total Beta (pCi/L)(2)	Total U (mg/L)(2)	Total U (kgs)	Calculated Total U-238 (pCi/L)(1)(2)
Avg.	0.603	153	104	0.21	0.49	73
Max.	1.566	266	275	0.40	1.97	135
Min.	0.219	0	0	0.01	0.01	3

The average uranium concentration for the previous twelve months was 0.60 mg/L. This is 67.4% of the Derived Concentration Guide (DOE Order 5400.5) for ingested water.

Comments: (1) The activity of this discharge has been and will continue to be reported as Uranium-238 (pCi/L) in accordance with the Ohio EPA format for reporting uranium. Since this does not account for the activity of the other uranium isotopes in the effluent, the total uranium data is also presented. The calculated total U-238 is based on a conversion factor of 337.84 pCi U-238/mg Total U applied to measure value of total uranium.

(2) Average values presented are flow-weighted.

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING JULY 31, 1993

ENCLOSURE B

FFCA: INITIAL REMEDIAL MEASURES

AND OTHER OPEN ACTIONS

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

INTRODUCTION

Enclosure B describes actions undertaken at the FEMP during the period July 1 through July 31, 1993, that are not covered by the reporting requirements of the Consent Agreement As Amended under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sections 120 and 106(a).

WORK ASSIGNMENTS AND PROGRESS

Descriptions of ongoing work progress are presented in the following sections of this report. The status of ongoing work in support of the Federal Facility Compliance Agreement (FFCA) is summarized in Table 1 of Enclosure B. Completed work previously reported upon has been eliminated for the sake of brevity. In this portion of the report and in Table 1, descriptions of actions are presented in a format consistent with that of the FFCA.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

1. Initial Remedial Measures

   Section C

   K-65 Silo Project - Status information on the K-65 Silo project normally reported in this section is being provided under Operable Unit 4: Silos 1-4.

2. Remedial Investigation/Feasibility Study (RI/FS)

   Status information on the Remedial Investigation/Feasibility Study (RI/FS) normally reported in this section is being provided separately in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).

3. Reports and Record Keeping

   Section B

   The RI/FS Monthly Technical Progress Report for June 1993 was transmitted to the U.S. EPA on July 20, 1993, as an integral part of the Consolidated Consent Agreement/Federal Facility Compliance Agreement/Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (CA/FFCA/FFA-CARE) Monthly Progress Report in accordance with the requirements of Section X of the Consent Agreement As Amended.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

CLEAN AIR ACT (CAA)

Section E

The Quarterly Particulate Emissions Report will now be incorporated into the Annual NESHAP Compliance Report.

RADIATION DISCHARGE INFORMATION

Section A

This information will now be submitted on an annual basis as part of the FEMP Annual Site Environmental Report.

REPORTING REQUIREMENTS

Section B

The Federal Facility Compliance Agreement Monthly Progress Report for June 1993, was transmitted to the U.S. EPA on July 20, 1993, as Enclosure B of the Consolidated Consent Agreement/Federal Facility Compliance Agreement/Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (CA/FFCA/FFA-CARE) Monthly Progress Report.

TABLE 1

STATUS OF ASSIGNMENT FOR WORK REQUIRED ON FEDERAL FACILITY COMPLIANCE AGREEMENT ACTIONS

ACTION	DESCRIPTION	COMPLETION TIME AFTER FFCA SIGNED	FY1992 STATUS
CERCLA			
1.	INITIAL REMEDIAL MEASURES		
1.C	Implement radon control plan approved by the U.S. EPA.	------	No longer applicable. Progress on actions to address radon emissions from the K-65 Silos are being reported separately under Section IX-Removal Actions of the Consent Agreement/FFCA Monthly Progress Report.
2.	REMEDIAL INVESTIGATION/FEASIBILITY STUDY		No action required.
2.A	RI/FS work is to be conducted in accordance with the U.S. EPA guidelines.	N/A	
2.B	--No Action Required--	------	Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).
2.E	Amend and submit revised RI/FS Work Plan to U.S. EPA if deficiencies are found.		Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA Sections 120 and 106(a).
2.F	Implement tasks described in the approved RI/FS Work Plan		Status information on the RI/FS is being reported in accordance with the requirements of Section X of the Consent Agreement As Amended under CERCLA sections 120 and 106(a).
3.	REPORTS AND RECORD KEEPING		
3.B	Submit monthly RI/FS progress reports.	monthly	The RI/FS Monthly Progress Report for June 1993 was transmitted to the U.S. EPA on July 20, 1993. (DOE-2469-93)

TABLE 1

STATUS OF ASSIGNMENT FOR WORK REQUIRED ON FEDERAL FACILITY COMPLIANCE AGREEMENT ACTIONS

CLEAN AIR ACT

B.4	Prepare annual progress report installation and replacement of emission control devices.	yearly	The Fifth Annual Progress Report on the installation and replacement of emission control devices was transmitted to the U.S. EPA on March 9, 1993 (DOE-1305-93).
C.	Provide annual reports to the U.S. EPA per 40 CFR 61.94(c).	yearly	The Annual NESHAP Compliance Report for CY1992 was transmitted to the U.S. EPA on June 28, 1993 (DOE-2281-93).
D.1	Provide U.S. EPA with yearly stack-testing schedule.	yearly	The 1989 stack testing schedule was transmitted to the U.S. EPA on June 16, 1989. A letter (DOE-1615-89) was transmitted to the U.S. EPA on September 15, 1989, indicating that, due to the uncertainty concerning resumption of production at the FEMP, the 1989 FFCA Stack Testing Program was being deferred. In August 1991, the DOE confirmed that no further production would take place at the facility, and renamed the facility the FEMP. Stacks in areas such as the Laboratory are currently being identified for potential testing during FY1993.
D.2	Provide U.S. EPA with stack-test results for stacks tested that year.	45 days	Because the FEMP has been out of production since mid-1989, there was no opportunity to perform stack testing. The DOE, in August 1991, confirmed that no future production will take place at the FEMP. Stacks in areas such as the Laboratory are currently being identified for potential testing during FY1993.
E.1	Maintain records of monthly particulate matter emissions.	------	Ongoing.
E.2	Provide quarterly reports to U.S. EPA on these emissions.	------	The Quarterly Particulate Emissions Report will now be incorporated into the Annual NESHAP Compliance Report.

RCRA

A.1	Conduct a hazardous waste determination on all waste streams.	30 days	Complete. Pursuant to the Proposed Amended Consent Decree, a RCRA waste evaluation was conducted on all identified waste streams pertaining to the PACD.
A.2	Commence a hazardous waste analysis program for materials in the landfill and going to the incinerator.	30 days	Complete. Operation of these units was discontinued and data on the waste which had gone to them was provided in a 30-day FFCA deliverable on August 17, 1986.

TABLE 1

STATUS OF ASSIGNMENT FOR WORK REQUIRED ON FEDERAL FACILITY COMPLIANCE AGREEMENT ACTIONS

A.5	Update the facility closure plan to reflect the year the facility expects to begin closure.	30 days	The Facility closure date is dependent upon closure schedules for individual TSD units as presented most recently in Section I of the RCRA Part B Permit Application transmitted to the Ohio EPA and the U.S. EPA on March 26, 1993 (DOE-1471-93). Facility closure will be completed on a date the last TSD unit is closed.
RADIATION DISCHARGE INFORMATION			
A.3	Report to U.S. EPA, Ohio EPA and Ohio Department of Health the results of the continuous liquid discharge samples.	yearly	The twenty-first Quarterly Discharge Report for the period October through December 1991 was transmitted to the U.S. EPA on February 20, 1992 (DOE-941-92). This information will now be reported on an annual basis.
REPORTING REQUIREMENTS			
B.	Issue monthly progress report of actions taken to ensure compliance with FFCA requirements.	monthly	June's FFCA Monthly Progress Report was transmitted to the U.S. EPA on July 20, 1993. (DOE-2469-93).

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING JULY 31, 1993

ENCLOSURE C

FEDERAL FACILITY AGREEMENT:
CONTROL AND ABATEMENT OF RADON-222 EMISSIONS

063

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

Introduction

The Federal Facility Agreement for Control and Abatement of Radon-222 Emissions (FFA-CARE) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (U.S. EPA), signed November 19, 1991, requires that a monthly report be submitted to the U.S. EPA regarding all steps undertaken in the preceding month to implement Part V of the agreement and that all data generated as a result of those actions be submitted.

Enclosure C fulfills those requirements by describing steps taken at the FEMP during the period June 1 through June 30, 1993, to implement Part V, Radon-222 Control and Abatement Plan, paragraphs 19-33 of the FFA-CARE.

After four months of data collection for the applicable parameters, preparation is now underway to evaluate the data for use in the Transport Release Models.

Work Assignments and Progress

In this section of Enclosure C, action descriptions and work progress are presented in a format consistent with that of the FFA-CARE. Immediately following this section are the K-65 Silos Report and the Selected Radon Data Report. Reporting this data is also a requirement included in the U.S. EPA approved Silos 1 and 2 Removal Action Work Plan (Removal Action No. 4).

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
Part V, 19 & 21	Implement the K-65 Silos 1 and 2 Removal Action in accordance with the approved Silos 1 and 2 Removal Action Work Plan.	12/1/91	Completed. Installation of the bentonite completed 11/28/91.
Part V, 20	Reduce radon-222 to a level As-Low-As Reasonably-Achievable (ALARA) with the goal as specified in the Silos 1 and 2 Removal Action Work Plan.	5/22/92	Completed. Concentrations offsite remain well below performance goal of removal action.
Part V, 22	Submit proposed methodology for estimating radon-222 concentration reductions resulting from completion of the Silos 1 and 2 Removal Action.	Within 60 days of completing removal action; 1/27/92.	The Bentonite Effectiveness Environmental Monitoring Plan was resubmitted to the U.S. EPA for comment and approval on 3/13/92. EPA approval was received on 4/24/92. DOE has prepared a revision to the methodology.
Part V, 23	Evaluate performance of the removal action and determine whether or not additional actions are needed prior to final remediation.	None specified.	Methodology for estimating radon-222 concentration reduction submitted to U.S. EPA per paragraph 20 of Part V. The first Bentonite Effectiveness Environmental Monitoring Report was issued to the U.S. EPA on 5/22/92. DOE submitted a revision to the methodology to the U.S. EPA on 12/17/92. Comment responses to the U.S. EPA's disapproval of the revised methodology is under way.
Part V, 24, 25, and 33	Demonstrate compliance with NESHAP Subpart Q at the completion of final remediation using a methodology approved by the U.S. EPA. Applicable to: Silos 1, 2, and 3; Waste Pits 1, 2, 3, 4, and 5 and the Clearwell; and any newly discovered radon-222 emission sources.	None specified.	No information to report for June 1993.

FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
Part V, 26	Directly measure radon-222 flux from Waste Pits 1, 2, 3, 4, and 5 and the Clearwell in the RI/FS under the CERCLA Consent Agreement.	None specified.	Radon sampling is complete for Pits 1, 2, and 3. All measurements were below the criteria set by the U.S. EPA. A final report was issued to the U.S. EPA on 6/25/92. A letter was received from the U.S. EPA on 10/16/92 giving approval of the proposed method for measuring the radon flux from Pit 4. The letter also stated that since the Clearwell is water covered, and Pit 5 is nearly 100% water covered, the flux from Pit 5 and the Clearwell may be assumed to be zero.
Part V, 26	Include direct measurement data from Waste Pits 1, 2, 3, 4, and 5 and the Clearwell in the RI/FS under the CERCLA Consent Agreement.	None specified.	See above.
Part V, 27	Estimate radon-222 emissions from Silo 3 based upon characterization data; include the estimated radon-222 emission data from Silo 3 in the RI/FS that includes Silo 3 under the CERCLA Consent Agreement.	None specified.	Completed. An estimate of radon flux from the K-65 Silo 3 was submitted to the U.S. EPA on 12/17/91. Radon flux for the silo was estimated to be above 20 pCi/m^2-s.
Part V, 28	Submit documentation or estimates of current radon-222 emissions from existing but newly discovered sources that contain radium-226 in sufficient concentrations to emit radon-222 in excess of NESHAP Subpart Q prior to final remediation.	Within 30 days of discovery.	No new sources identified.
Part V, 30	Submit methodology for direct measurement or other appropriate means of characterization of the relevant emissions pursuant to paragraph 29 of the FFA.	Within 45 days of the U.S. EPA response pursuant to paragraph 29.	None required.

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FFA Part, Paragraph(s)	Description of Commitment	FFA Due Date	Status of Commitment
Part V, 31	Submit results of measurements pursuant to paragraph 30.	Within 30 days of U.S. EPA approval of characteriz ation method.	None required.
Part VI, 31	Submit monthly report on steps undertaken to implement Part V of the FFA-CARE and the data obtained in the preceding month.	20th day of succeeding month.	The progress report being submitted herewith as an integral part of the CERCLA Consent Agreement Monthly Progress Report.

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CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

Period Ending July 31, 1993

Data Reporting Requirements: RA No. 4: Silos 1 and 2

As defined in the Silos 1 and 2 Removal Action Work Plan and the Federal Facility Agreement, data associated with monitoring the effectiveness of the bentonite installation are included in the following tables: the K-65 Silos Report and the Selected Radon Data Report.

The K-65 Silos Report includes data on the following parameters:

- Ambient temperature and pressure near the silos.
- Silos 1 and 2 headspace temperature.
- Silos 1 and 2 differential pressure.
- Silos 1 and 2 radon headspace concentration.
- Silos 1 and 2 headspace humidity

The Selected Radon Data Report includes radon data from the following locations:

- Air monitoring station number 5 (AMS-5)
- Air monitoring station number 6 (AMS-6)
- Pilot Plant
- Background data
- K-65 Monitoring Data (K-65 NW, K-65 SW, K-65 NE, K-65 SE).

The radon data submitted in Enclosure C: Radon Data for the K-65 Removal Action and in all previous consent agreement status updates is considered to be draft. The radon data, although collected by qualified technicians using detailed procedures, was not obtained in a manner which would withstand a rigorous validation process. The various field and laboratory procedures are currently being reviewed and modified to be in accordance with the conditionally approved Site-Wide CERCLA Quality Assurance Project Plan (SCQ). Once the sampling and analysis procedures have been modified and approved, along with specific validation protocols, suspect radon data will either be qualified or rejected.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT

LOCATION: Silo # 1 DATE: July 1993

Day	Ambient Temp Deg. F	Ambient Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
*1	71.5	29.35	62.6	0	0.037	351706
2	75.5	29.38	62.7	0	0.050	354439
3	78.5	29.40	63.3	0	0.023	457830
4	80.9	29.44	64.0	0	0.003	430600
5	80.6	29.43	64.4	0	0.003	371659
6	80.3	29.44	64.8	0	0.002	252335
7	81.0	29.47	64.9	0	0.003	288884
8	80.8	29.49	65.3	0	0.003	375631
9	81.9	29.48	65.7	0	0.003	259183
10	80.2	29.52	66.1	0	0.003	321473
11	78.0	29.43	66.3	0	-0.004	375608
12	76.3	29.39	66.2	0	0.028	380686
13	77.7	29.48	66.2	0	0.002	273976
14	75.8	29.50	66.4	0	0.001	335713
15	72.5	29.53	66.3	0	0.000	183862
16	71.2	29.50	65.5	0	0.000	321817
17	75.3	29.48	65.5	0	0.002	293830
18	77.6	29.48	65.8	0	0.002	361805
19	78.5	29.41	66.3	0	0.002	250186
20	74.3	29.50	66.4	0	0.001	199846
21	72.8	29.52	66.5	0	0.001	180654
22	73.7	29.54	66.5	0	0.001	197792
23	75.7	29.49	66.5	0	0.002	240363
24	80.2	29.49	66.8	0	0.003	359691
25	83.4	29.47	67.3	0	0.003	416916
26	81.2	29.42	67.8	0	0.002	338946
27	78.2	29.43	67.9	0	0.002	355569
28	82.9	29.39	68.2	0	0.003	262303
29	74.8	29.41	68.2	0	0.001	70086
30	70.4	29.45	67.8	0	-0.000	85608
31	67.6	29.50	67.3	0	-0.000	226947
ARITHMETIC MEAN	77.1	29.46	66.0	0.0	0.006	295998
MAXIMUM	83.4	29.54	68.2	0.0	0.050	457830
MINIMUM	67.6	29.35	62.6	0.0	-0.004	70086
MEDIAN	77.7	29.47	66.3	0	0.002	321473

Note: * – Only partial data available due to storm.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT

LOCATION: Silo # 2 DATE: July 1993

Day	Ambient Temp Deg. F	Ambient Pres In. Hg.	Temperature Head Space Deg. F	Inter. Hum. %	Diff. Pres In. HG	Head Space Radon (pCi/l)
*1	71.5	29.35	61.9	97.0	0.018	2763627
2	75.5	29.38	62.0	96.7	0.031	2666662
3	78.5	29.40	62.6	96.5	0.008	2759610
4	80.9	29.44	63.3	96.3	-0.011	2783305
5	80.6	29.43	63.7	96.1	-0.011	2726521
6	80.3	29.44	64.0	96.0	-0.011	2684287
7	81.0	29.47	64.1	95.7	-0.011	2740488
8	80.8	29.49	64.5	95.5	-0.011	2888475
9	81.9	29.48	64.9	95.5	-0.011	2771186
10	80.2	29.52	65.2	95.4	-0.011	2922478
11	78.0	29.43	65.4	95.2	-0.012	2908511
12	76.3	29.39	65.3	95.5	0.010	3042364
13	77.7	29.48	65.4	95.5	-0.011	2914248
14	75.8	29.50	65.6	95.4	-0.010	2992814
15	72.5	29.53	65.4	95.2	-0.010	2907264
16	71.2	29.50	64.7	95.7	-0.010	3006615
17	75.3	29.48	64.6	95.7	-0.010	2961969
18	77.6	29.48	65.0	95.3	-0.010	2945591
19	78.5	29.41	65.4	94.7	-0.010	2905851
20	74.3	29.50	65.5	94.6	-0.010	2950163
21	72.8	29.52	65.6	94.7	-0.010	2903855
22	73.7	29.54	65.6	94.6	-0.010	2862286
23	75.7	29.49	65.6	94.5	-0.010	2918124
24	80.2	29.49	65.8	94.4	-0.010	2951992
25	83.4	29.47	66.4	94.1	-0.011	2970367
26	81.2	29.42	66.8	94.2	-0.010	2983502
27	78.2	29.43	66.8	93.9	-0.010	2989738
28	82.9	29.39	67.2	93.6	-0.011	2811073
29	74.8	29.41	67.2	93.8	-0.010	2840338
30	70.4	29.45	66.7	93.9	-0.010	3018753
31	67.6	29.50	66.2	93.5	-0.010	3001627
ARITHMETIC MEAN	77.1	29.46	65.1	95.1	-0.007	2886893
MAXIMUM	83.4	29.54	67.2	97.0	0.031	3042364
MINIMUM	67.6	29.35	61.9	93.5	-0.012	2666662
MEDIAN	77.7	29.47	65.4	95.3	-0.010	2908511

Note: * – Only partial data available due to storm.

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/ FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Project
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

K-65 SILO REPORT
RADON CONCENTRATIONS

MONTH: JULY

REPORT GENERATED: 08/04/93

Daily Summary of Recorded Headspace Concentrations
(recorded at 5 minute intervals)

	SILO 1				SILO 2			
Date	Average	Maximum	Minimum	Std. Dev.	Average	Maximum	Minimum	Std. Dev.
07/01/93	W 351,706	697,916	66,932	184,226	W 2,763,627	2,909,180	1,927,480	116,803
07/02/93	354,439	664,084	43,502	206,277	2,666,662	2,861,290	1,424,660	192,050
07/03/93	457,830	668,569	145,309	148,552	2,759,610	2,885,230	2,047,200	94,830
07/04/93	430,600	634,155	105,577	154,302	2,783,305	2,909,180	2,550,020	66,161
07/05/93	371,659	610,423	98,356	132,973	2,726,521	2,957,060	1,951,420	188,255
07/06/93	252,335	523,075	35,070	138,631	2,684,287	2,957,060	2,071,140	169,782
07/07/93	288,884	550,068	68,214	129,412	2,740,488	2,981,010	2,166,920	171,820
07/08/93	375,631	547,134	74,096	133,934	2,888,475	3,004,950	2,430,300	74,467
07/09/93	259,183	502,048	55,839	118,969	2,771,186	3,028,900	2,023,250	224,381
07/10/93	321,473	539,060	50,623	137,152	2,922,478	3,052,840	2,358,470	96,573
07/11/93	375,608	633,423	82,613	151,169	2,908,511	3,124,670	1,496,490	222,717
07/12/93	380,686	670,105	81,272	174,587	3,042,364	3,172,560	2,645,790	69,391
07/13/93	273,976	590,437	38,992	178,112	2,914,248	3,100,730	2,286,640	144,782
07/14/93	335,713	552,944	81,969	141,370	2,992,814	3,124,670	2,597,910	81,418
07/15/93	183,862	541,271	13,147	154,848	2,907,264	3,124,670	2,358,470	143,380
07/16/93	321,817	646,128	34,434	167,260	3,006,615	3,124,670	2,573,960	107,679
07/17/93	293,830	555,162	18,312	190,490	2,961,969	3,124,670	2,502,130	129,149
07/18/93	361,805	567,651	98,356	135,363	2,945,591	3,076,780	1,759,870	140,624
07/19/93	250,186	700,205	42,865	176,159	2,905,851	3,124,670	2,430,300	130,907
07/20/93	199,846	465,987	44,139	110,383	2,950,163	3,052,840	2,645,790	63,555
07/21/93	180,654	494,824	34,434	130,660	2,903,855	3,076,780	2,597,910	93,139
07/22/93	197,792	461,698	25,387	119,277	2,862,286	3,052,840	2,214,810	135,707
07/23/93	240,363	503,471	43,502	130,015	2,918,124	3,100,730	2,478,190	120,862
07/24/93	359,691	555,881	76,076	157,435	2,951,992	3,100,730	2,573,960	75,876
07/25/93	416,916	596,363	104,282	144,205	2,970,367	3,100,730	2,669,740	67,770
07/26/93	338,946	649,860	46,742	156,806	2,983,502	3,100,730	2,550,020	86,893
07/27/93	355,569	601,509	12,515	165,437	2,989,738	3,292,280	2,669,740	74,668
07/28/93	262,303	567,651	38,302	147,907	2,811,073	3,172,560	1,807,760	301,199
07/29/93	70,086	375,064	20,898	50,246	2,840,338	3,124,670	1,975,370	180,968
07/30/93	85,608	433,134	4,150	78,193	3,018,753	3,196,500	2,789,460	72,635
07/31/93	226,947	527,424	22,799	163,206	3,001,627	3,148,610	2,550,020	81,203

Grab Samples of Headspace

Date	SILO 1 Concentration	SILO 2 Concentration
07/02/93	54,000	3,680,000
07/06/93	764,000	3,348,000
07/08/93	187,000	3,630,000
07/14/93	789,000	3,691,000
07/15/93	16,000	3,806,000
07/21/93	662,000	3,866,000
07/23/93	71,000	3,569,000
07/27/93	68,000	4,210,000
07/30/93	57,000	3,971,000

Notes:
1. All values reported in pCi/L.
2. "W" indicates incomplete data due to weather related system failure.

4706

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Report
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

MONTH: Jul

YEAR: 1993

SELECTED RADON DATA REPORT

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	K-65, NW (pCi/L)	K-65, SW (pCi/L)	K-65, NE (pCi/L)	K-65, SE (pCi/L)
07/01/93	1.7	1.2	1.6	1.1
07/02/93	1.0	0.6	1.4	0.9
07/03/93	1.1	0.6	1.5	1.7
07/04/93	1.4	1.4	3.0	2.0
07/05/93	1.5	1.5	4.2	1.9
07/06/93	0.8	0.7	1.1	0.7
07/07/93	1.4	1.2	2.2	1.1
07/08/93	1.3	1.2	2.8	1.7
07/09/93	1.5	1.5	3.1	1.7
07/10/93	1.4	1.4	2.0	1.2
07/11/93	1.6	1.4	2.9	1.6
07/12/93	1.2	1.1	2.3	1.6
07/13/93	1.5	1.6	1.5	1.2
07/14/93	1.3	1.0	2.0	1.3
07/15/93	1.6	2.0	1.7	1.2
07/16/93	1.5	1.7	2.0	1.5
07/17/93	1.3	1.8	1.4	1.0
07/18/93	2.9	1.8	3.5	2.0
07/19/93	1.5	1.2	2.6	1.4
07/20/93	1.5	1.6	3.1	1.8
07/21/93	1.3	1.4	2.1	1.4
07/22/93	1.6	1.8	1.5	1.2
07/23/93	1.5	1.7	1.7	1.2
07/24/93	1.6	1.6	2.4	1.6
07/25/93	4.9	1.7	3.2	2.0
07/26/93	2.2	2.2	6.3	2.5
07/27/93	1.7	2.0	5.1	2.2
07/28/93	2.2	2.1	3.8	1.8
07/29/93	1.2	1.0	2.0	1.1
07/30/93	1.5	1.4	2.4	1.7
07/31/93	2.2	2.1	4.2	2.1

Monthly Averages

	K-65, NW (pCi/L)	K-65, SW (pCi/L)	K-65, NE (pCi/L)	K-65, SE (pCi/L)
AVERAGE	1.6	1.5	2.6	1.5
MAXIMUM	4.9	2.2	6.3	2.5
MINIMUM	0.8	0.6	1.1	0.7
MEDIAN	1.5	1.4	2.2	1.5
STD. DEV.	0.8	0.6	1.4	0.6

NOTES:
1. "&" indicates data loss due to instrument malfunction.
2. "@" erroneous data collected.

073

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITIES COMPLIANCE AGREEMENT/
FEDERAL FACILITY AGREEMENT MONTHLY PROGRESS REPORT

FACILITY: Fernald Environmental Management Report
U.S. Department of Energy
7400 Willey Road, P.O. Box 398704
Cincinnati, Ohio 45239 Hamilton

MONTH: Jul
YEAR: 1993

SELECTED RADON DATA REPORT

Monthly Summary of Selected Sampling Locations

Daily Averages

Date	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
07/01/93	0.6	0.7	0.5	0.6
07/02/93	0.4	0.4	0.3	&
07/03/93	0.4	0.5	0.3	&
07/04/93	0.9	0.9	0.6	&
07/05/93	1.1	1.1	0.8	&
07/06/93	0.4	0.6	0.4	&
07/07/93	0.7	0.6	0.5	&
07/08/93	0.8	0.8	0.6	&
07/09/93	1.1	1.0	0.9	&
07/10/93	0.8	0.8	0.5	&
07/11/93	0.9	0.9	0.7	&
07/12/93	0.6	0.6	0.4	&
07/13/93	0.8	0.7	0.5	&
07/14/93	0.8	0.8	0.6	&
07/15/93	0.9	1.0	0.6	&
07/16/93	0.9	1.0	0.6	&
07/17/93	0.8	0.7	0.4	&
07/18/93	1.1	1.2	0.8	&
07/19/93	0.7	0.7	0.5	&
07/20/93	1.1	1.0	0.8	&
07/21/93	0.9	0.9	0.6	&
07/22/93	1.0	0.8	0.5	@
07/23/93	1.0	0.9	0.5	@
07/24/93	1.0	0.9	0.6	@
07/25/93	1.2	1.1	0.7	@
07/26/93	1.5	1.4	1.1	@
07/27/93	1.5	1.3	1.0	@
07/28/93	1.5	1.3	1.0	@
07/29/93	0.7	0.6	0.6	@
07/30/93	1.0	0.8	0.6	@
07/31/93	1.6	1.3	0.9	@

Monthly Averages

	AMS 5 (pCi/L)	AMS 6 (pCi/L)	PILOT PLANT (pCi/L)	BKGRD (pCi/L)
AVERAGE	0.9	0.9	0.6	not applicable
MAXIMUM	1.6	1.4	1.1	not applicable
MINIMUM	0.4	0.4	0.3	not applicable
MEDIAN	0.9	0.8	0.6	not applicable
STD. DEV.	0.4	0.4	0.3	not applicable

NOTES:
1. "&" indicates data loss due to instrument malfunction.
2. "@" erroneous data collected.

4708

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING JULY 31, 1993

ENCLOSURE D

DRILLING/BORING LOGS

075

CONSOLIDATED CONSENT AGREEMENT/FEDERAL FACILITY COMPLIANCE AGREEMENT/FEDERAL FACILITY AGREEMENT FOR CONTROL AND ABATEMENT OF RADON-222 EMISSIONS MONTHLY PROGRESS REPORT

PERIOD ENDING JULY 31, 1993

ENCLOSURE D

SOIL BORING LOGS

RI/FS

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER: 50.03.~~05~~ 22 RJB22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066 KP 6-10-93	COORDINATES:	DATE 6-10-93
ELEVATION:	GWL: Depth 68.25 FT Date/Time 7-12-93/1440	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 1 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
.5	119735 1010 6-10-93	4	6	Very Stiff (10YR, 4/2) Dark Grayish Brown, Organic Silty Clay with Gravel, slight plasticity, slightly moist	2.0	OL	m-tip = 1.7 ppm; Bγ = 80 cpm; α = 0 cpm
1.0	119738 1010 6-10-93	5	6	Very Stiff (10YR, 6/4) Light Yellowish Brown, Organic Silty Clay with Gravel, slight plasticity, slightly moist KP 7-13-93	2.5	OL	0-.5 FT Total U&Th #119736
1.5	119739 1010 6-10-93	4	6	Very Stiff (10YR, 6/4) Light Yellowish Brown, Silty Clay with trace organics, slight plasticity, slightly moist	3.0	CL	
2.0	119740 1015 6-10-93	8	6	Very Stiff (10YR, 6/6) Brownish Yellow, Silty Clay, slight plasticity, moist	3.5	CL	m-tip = 0.0 ppm; Bγ = 70 cpm; α = 0 cpm
2.5	119741 1015 6-10-93	7	6	Very Stiff (10YR, 6/3) Pale Brown, Silty Clay, slight plasticity, moist	3.0	CL	2.0-2.5 FT Total U&Th #119742
3.0	1015 6-10-93	8	0 ~~N/A~~ KP 6-10-93	No Recovery	N/A	N/A	
3.5	119744 1030 6-10-93	7	6	Very Stiff (10YR, 5/3) Brown, Silty Clay, slight plasticity, moist	3.0	CL	m-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm
4.0	119745 1030 6-10-93	7	6	Very Stiff (10YR, 5/3) Brown, Silty Clay with trace gravel, slight plasticity, moist	3.0	CL	
4.5	1030 6-10-93	10	0	No Recovery	N/A	N/A	
5.0	119746 1035 6-10-93	7	6	Very Stiff (10YR, 5/3) Brown, Silty Clay, with trace gravel, slight plasticity, moist	3.0	CL	m-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm

PRELIMINARY

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson, Jeff Bentley

SAA - Same As Above

NA - Not Applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart.

Background Readings 6-10-93: m-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm

RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER 41066	COORDINATES.	DATE 6-10-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 7-13-93
DRILLING METHODS Cable Tool		PAGE 2 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	119753 1035 6-10-93	8	6	Very Stiff (10YR, 5/3) Brown, Silty Clay, slight plasticity, moist	2.5	CL	Total U&Th 5.0-55 #119752
6.0	1035 6-10-93	9	N/A	No Recovery	N/A	N/A	
6.5	119747 1045 6-10-93	7	6	Very Stiff (10YR, 5/4) Yellowish Brown Silty Clay with trace gravel, slight plasticity, moist	2.5	CL	m-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm
7.0	119748 1045 6-10-93	10	6	Very Stiff (10YR, 5/4) Yellowish Brown Silty Clay with coarse gravel, slight plasticity, moist	3.0	CL	
7.5	119749 1045 6-10-93	10	4	Very Stiff (10YR, 5/4) Yellowish Brown Silty Clay with coarse gravel, slight plasticity, moist	3.0	CL	
8.0	119750 1050 6-10-93	27	6	Very Stiff (10YR, 5/6) Yellowish Brown Silty Clay with coarse sand, slight plasticity, moist	3.0	CL	m-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm
8.5	119751 1050 6-10-93	50/.3	2	Very Stiff (10YR, 4/6) Dark Yellowish Brown with trace trace coarse gravel, slight plasticity, moist	2.5	CL	
9.0	1050 6-10-93	N/A	N/A	No Recovery	N/A ~~3.0~~	N/A ~~CL~~	CP 6-10-93
9.5	119754 1625 6-10-93	4	6	Very Stiff (10YR, 5/1) Gray, Silty Clay, slight plasticity, slightly moist	2.5	CL	m-tip = 0.0 ppm; Bγ = 70 cpm; α = 0 cpm
10.0	119755 1625 6-10-93	7	6	Very Stiff (10YR, 5/1) Gray, Silty Clay, slight plasticity, slightly moist	3.0	CL	

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Jeff Bentley

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings 6-10-93
m-tip = 0.0 ppm
Bγ = 80 cpm
α = 0 cpm

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER. 41066	COORDINATES.	DATE 6-10-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 7-13-93
DRILLING METHODS Cable Tool		PAGE 3 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.5	119756 1625 6-10-93	17	4	Medium Dense (10YR, 5/8) Yellowish Brown, Clayey Silt, with trace Sand, slight plasticity, moist	ML	N/A	10.0 - 10.5 FT Total U&Th #119757
11.0	119758 1635 6-10-93	7	6	Very Stiff (10YR, 5/1) Gray Silty Clay with trace Sand, slight plasticity, moist	CL	3.0	m-tip = 0.0 ppm; βγ = 70 cpm; α = 0 cpm
11.5	119759 1635 6-10-93	10	6	SAA	CL	3.0	
12.0	119760 1635 6-10-93	10	5	SAA	CL	3.0	
12.5	119761 1645 6-10-93	10	6	Very Stiff (10YR 5/1) Gray Silty Clay with medium sand, slight plasticity, moist	CL	2.5	m-tip = 0.0 ppm; βγ = 90 cpm; α = 0 cpm
13.0	119762 1645 6-10-93	9	6	SAA	CL	2.0	
13.5	119763 1645 6-10-93	12	4	SAA	CL	2.0	
14.0	1700 6-10-93	7	N/A	No Recovery	N/A	N/A	m-tip = ppm; βγ = N/A cpm; α = cpm
14.5	1700 6-10-93	10	N/A	No Recovery	N/A	N/A	2 Spoons Driven
15.0	1700 6-10-93	14	N/A	No Recovery	N/A	N/A	

PRELIMINARY

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Bob Johnson
Jeff Bentley

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Background Readings:
6-10-93 { m-tip = 0.0 ppm; βγ = 90 cpm; α = 0 cpm

FERNALD
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME CRUS PHASE II		
BORING NUMBER 41066	COORDINATES		DATE 11JUN93
ELEVATION	GWL: Depth	Date/Time	DATE STARTED 10JUN93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 7-13-93
DRILLING METHODS CABLE TOOL			PAGE 4 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	11JUN 0938 ~~10-2-93~~ ~~119764~~	7	6	STIFF (5Y 4/1) DARK GRAY, SILTY CLAY, TRACE COARS SAND, MEDIUM PLASTICITY, MOIST	CL	1.25	MT: 0 BY: 90 α: 0 15.0-15.5 Ft. Total of 2 #119764
16	11JUN 0938 119765	10	2	SAA	CL	>4.5	
	/	7	0	NR	–	–	
17	11JUN 0953 119766	10	6	SAA	CL	0.75	MT: 0 BY: 70 α: 0
	11JUN 0953 119767	21	3	SAA	CL	2.5	
18	/	10	0	NR	–	–	
	11JUN 1003 119768	13	5	SAA + FINE GRAVEL	CL	2.25	MT: 0 BY: 70 α: 0
19	/	14	0	NR	–	–	
	/	50/3	0	NR	–	–	
20	11JUN 1056 119769	7	6	HARD (5Y 4/1) DARK GRAY, SILTY CLAY, TRACE GRAVEL, MEDIUM PLASTICITY, MOIST	CL	4.25	

PRELIMINARY

DRILLING FIRM: PENN DRILL
DRILLERS: BOB JOHNSON, JEFF BENTLY
P.E.: CYCLONE 42
DESCRIPTION BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = ppm
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP: 0-0.4 ppm
BY: 90 CPM
α: 0 CPM
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

080

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS - 4706

PROJECT NUMBER 50.03. 22	PROJECT NAME CRUS PHASE II		
BORING NUMBER 41066	COORDINATES		DATE 11JUN93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 10JUN93
ENGINEER/GEOLOGIST B. E. MOLLER	Depth	Date/Time	DATE COMPLETED 7-13-93
DRILLING METHODS CABLE TOOL			PAGE 5 OF 24

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20	11JUN 1056 KP 6-10-93 119770	10	4	0-2IN (5Y, 5/1) GRAY SILTY SAND, WET 2-4IN VERY STIFF (5Y, 4/1) DARK GRAY SILTY SAND, TRACE GRAVEL, MEDIUM PLASTICITY, MOIST	CL	3.5	MT: 0 BV: 90 α: 0
	/	12	0	NR	—	—	20.0-20.5FT Total Depth #119770 2 SPOONS
21	11JUN 1406 119771	3	6	STIFF (5Y, 4/1) DARK GRAY, SILTY CLAY, TRACE SUBROUNDED FINE GRAVEL, MEDIUM PLASTICITY, MOIST	CL	1.25	MT: 0 BV: 90 α: 0
	/	4	0	NR	—	—	
22	/	8	0	NR	—	—	
	11JUN 1421 119772	3	3	SAA	CL	1.25	MT: 0 BV: 80 α: 0
23	/	6	0	NR	—	—	
	/	9	0	NR	—	—	
24	11JUN 1435 119773	3	5	SAA	CL	2.0	MT: 0 BV: 80 α: 0
	/	4	0	NR	—	—	
25							

PENN DRILL
B03 JOHNSON, JEFF BENFLEY
CYCLONE 42

0-0.4
90
0

PRELIMINARY

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME CRU 5 PHASE II		
BORING NUMBER 41066	COORDINATES	DATE 11JUN93	
ELEVATION	GWL Depth Date/Time	DATE STARTED 10JUN93	
ENGINEER/GEOLOGIST B.E. MULLER	Depth Date/Time	DATE COMPLETED 7-13-93	
DRILLING METHODS CABLE TOOL		PAGE 6 OF 24	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25		9	0	NR	—	—	2 SPOONS
KP 26	11JUN 1457 6-30-93 ~~119774~~	18	6 *	STIFF (5Y, 4/1) DARK GRAY, SILTY CLAY, TRACE SUBROUNDED FINE GRAVEL, MEDIUM PLASTICITY, MOIST	CL	1.25	MT: 0 BR: 80 α: 0 25.5-26.0 FT total clay #119774
		24	0	NR	—	—	2 SPOONS
27		27	0	NR	—	—	* SEE FADL
	14JUN 1040 119775	3		(STIFF (10YR, 5/1) GRAY, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.0	M-tip: 0.0 BR: 80 α: 0
28	14JUN 1040 119776	3		SAA	CL	2.0	Rinsate #: 9784
		6		NR	—	—	
29	14JUN 1050 119777	3		STIFF (10YR, 5/1) GRAY, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	1.5	M-tip: BR: 100 α: 0
		3		NR	—	—	
30		5		NR	—	—	

BEM 16JUN93

~~CME~~ PENN DRILL

BOB JOHNSON, JOHN LEON

CYCLONE 42

082

UNITS MEASURED
M-TIP = ppm
BR = CPM
α = CPM

BACKGROUND READINGS
M-TIP 0
BR 60
α 0

Background: M-tip = 0 ppm
BR = 60 cpm
α = 0 cpm

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER. 41066	COORDINATES.	DATE 6-14-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED. 7-13-93
DRILLING METHODS Cable Tool		PAGE 7 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.5	1430 6-14-93	13	6	~~10YR~~ Stiff (10YR, 5/1) Gray Silty Clay, slight plasticity moist	CL	2.0	m-tip = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm; 30.0 - 30.5 FT; Total U 119778; Total Th
31.0	1430 6-14-93	6	0	No Recovery	N/A	N/A	
31.5	1430 6-14-93	18	0	No Recovery	N/A	N/A	
32.0	119779 1440 6-14-93	7	5	Stiff (10YR, 5/1) Gray Gravelly Clay slight plasticity moist	CL	1.5	m-tip = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm
32.5	1440 6-14-93	26	0	No Recovery	N/A	N/A	
33.0	1440 6-14-93	29	0	No Recovery	N/A	N/A	
33.5	119780 1455 6-14-93	17	6	Dense (10YR, 5/1) Gray Clayey Silt with trace gravel, slight plasticity, moist	ML	N/A	m-tip = 0.0 ppm; Bγ = 70 cpm; α = 0 cpm
34.0	119781 1455 6-14-93	26	6	Dense (10YR, 5/1) Gray Clayey Silt with trace gravel, slight plasticity, moist	ML	N/A	
34.5	1455 6-14-93	33	0	No Recovery	N/A	N/A	
35.0	119782 1510 6-14-93	4	6	Dense (10YR, 5/1) Gray Silt Sand, slightly moist	SM	N/A	m-tip = 0.0 ppm; Bγ = 70 cpm; α = 0 cpm

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment Cyclone 42
Driller Brian Coulter

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

083

Background (6-14-93) m-tip 0.0, Bγ 60, α 0

RI/FS 706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER 41066	COORDINATES.	DATE 6-14-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED 7-13-93
DRILLING METHODS Cable Tool		PAGE 8 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
35.5	119783 1510 6-14-93	6	5	Loose (10YR, 5/1) Gray, Clayey Silt, slight plasticity, moist	ML	N/A	35.0 - 35.5 FT Total U & TL # 119783
	1510 6-14-93	13	0	No Recovery	N/A	N/A	
36.0 36.5	119785 0850 6-15-93	37	6	Dense (5Y, 5/1) Gray, Silty Sand, Non-plastic, moist	SM	N/A	m-tip = 0.0 ppm; βγ = 70 cpm; α = 0 cpm
37.0	119786 0950 6-15-93	50	6	SAA	SM	N/A	
37.5	0950 6-15-93	N/A	0	No Recovery	N/A	N/A	
38.0	119787 0900 6-15-93	42	6	Very Dense (5Y, 5/1) Gray, Poorly Graded Fine Sand, moist	SP	N/A	m-tip = 0.0 ppm; βγ = 80 cpm; α = 0 cpm
38.5	119788 0900 6-15-93	50/.3	3	SAA	SP	N/A	
39.0	0900 6-15-93	N/A	0	No Recovery	N/A	N/A	
39.5	119789 0910 6-15-93	13	6	Very Dense (5Y, 5/1) Gray, Poorly Graded Fine Sand, slightly moist	SP	N/A	m-tip = 0 ppm; βγ = 60 cpm; α = 0 cpm; ~~39.5-39.9 FT~~ 40.0-40.5 FT Total U & TL Total TL #119791
40.0	119790 0910 6-15-93	16	6	Medium Dense SAA	SP	N/A	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller Craig Coulter, Bill Sibert

SAA - Same as above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

084 Background m-tip = 0.0 ppm; βγ = 50 cpm; α = 0 cpm (6-15-93)

6-14-93 m-tip = 0.0 ppm; βγ = 60 cpm; α = 0 cpm

PRELIMINARY

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 9 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
40.5	0910 6-15-93	18	4	SAA	SP	N/A	
41.0							
41.5							
42.0							
42.5							
43.0							
43.5							
44.0							
44.5							
45.0							

PRELIMINARY

NOTES.

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: Craig [illegible]

B. [illegible]

SAA - Same As Above
NA - Not Applicable

Samples collected per ASTM standard penetration test

[illegible]

Be [illegible]

[illegible] ppm
[illegible] ppm
[illegible] ppm

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 10 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46.0	119792 0935 6-15-93	16 17 20	15	Dense (5Y, 6/1) light-gray, Poorly graded fine sand, dry	SP	N/A	m-tip = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm
47.0							
48.0							
49.0							
50.0	119794 1030 6-15-93	50/.3	3	Very Dense (5Y, 4/1) Dark Gray, Well Graded Gravelly Sand, Moist	GW	N/A	m-tip = 0.0 ppm; Bγ = 65 cpm; α = 0 cpm
51.0							
52.0							
53.0							
54.0							
55.0	119795 1410 6-15-93	50	4	Very Dense (2.5Y, 5/2) Grayish Brown, Poorly Graded fine Sand, moist	SP	N/A	m-tip = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm
56.0							
57.0							
58.0							
59.0							
60.0							

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Craig Coulter

Bill Sheets

SAA - Same As Above

NA - Not Applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Charts

PRELIMINARY

Background

6-15-93 m-tip = 0.0 ppm; Bγ = 52 cpm; α = 0 cpm

086

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 411066	COORDINATES:	DATE 6-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 11 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61.0	119796 1430 6-15-93	14 17 47	14	Very Dense (5Y, 6/1) light gray, well Graded Sand, Dry	SW	N/A	m-tip = 0.0 ppm; BY = 60 cpm; α = 0 cpm
62.0							
63.0							
64.0							
65.0	119798 1610 6-15-93	54/4	5	Very Dense (5Y, 4/1) olive gray, well Graded Sand, moist	SW	N/A	m-tip = 0.0 ppm; BY = 40 cpm; α = 0 cpm
66.0							
67.0							
68.0							
69.0							
70.0	119799 1640 6-15-93	6 7 9	11	Medium Dense (5Y, 4/2) olive gray Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm; BY = 80 cpm; α = 0 cpm
71.0							
72.0							
73.0							
74.0							
75.0							

PRELIMINARY

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Craig Cutler

Bill Sinnett

SAM - Same As Above

NA - Not Applicable

Samples collected per ASTM standard Penetration Test.

Colors identified using Munsell Color Chart

Background 6-15-93: m-tip = 0.0 ppm; BY = 50 cpm; α = 0 cpm

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable-Tool		PAGE 12 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
76.0	119801 1700 6-15-93	29 50	13	Very Dense (5Y, 4/2) Olive Gray, Well Graded Sand, wet	SW	N/A	M-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm
77.0							
78.0							
79.0							
80.0	119803 0835 6-16-93	4 6 10	14	Medium Dense (5Y, 4/2) Olive Gray, Well Graded Sand, wet	SW	N/A	M-tip = 0.0 ppm; Bγ = 70 cpm; α = 0 cpm
81.0							
82.0							
83.0							
84.0							
85.0	119806 0940 6-16-93	50/4	5	Very Dense (5Y, 5/2) Olive Gray, Well Graded Sand, wet	SW	N/A	M-tip = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm; Rinsate #119805
86.0							
87.0							
88.0							
89.0							
90.0							

PRELIMINARY

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Failing 412

Driller: Craig Cooper, Bill Siebert

SAA - Same As Above

NA - Not Applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

Background

6-15-93: M-tip = 0.0 ppm; Bγ = 50 cpm; α = 0 cpm

6-16-93: M-tip = 0.0 ppm; Bγ = 80 cpm; α = 0 cpm

088

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-16-93
ENGINEER/GEOLOGIST: K Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 13 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
91.0	119807 1020 6-16-93	6 9 8	18	Medium Dense (5Y, 5/2) Olive Gray, Well Graded Sand, wet	SW	N/A	m-tip = 0.0 ppm BG = 60 cpm α = 0 cpm
92.0							
93.0							
94.0							
95.0							
96.0	119809 1100 6-16-93	21 33 50	17	Very Dense (5Y 5/2) Olive Gray, Well Graded Sand, wet	SW	N/A	m-tip = 0.0 ppm BG = 60 cpm α = 0 cpm
97.0							
98.0							
99.0							
100.0							
101.0	119811 1400 6-16-93	9 [illegible] 28	8	Dense (5Y, 4/3) Olive, Well Graded Sand, wet	SW	N/A	m-tip 0.0 ppm BG 50 cpm α 0 cpm
102.0							
103.0							
104.0							
105.0							

NOTES.

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: Craig Coulter

Bill Smith

SAA - Same As Above

NA Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background
m-tip 0.0 ppm
BG 50 cpm
α 0 cpm

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-16-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 14 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
106.0	119813 1500 6-16 93	19 33 50	18	Very Dense (5Y, 4/3) Olive, Well Graded Sand, Wet	SW	N/A	m-tip = 0.0 ppm; BX = 60 cpm; α = 0 cpm
107.0							
108.0							
109.0							
110.0	119815 0900 6-17-93	7 13 50	18	Very Dense (5Y, 4/2) Olive Gray, Well Graded Gravelly Sand, Wet	SW	N/A	m-tip = 0.0 ppm; BX = 60 cpm; α = 0 cpm
111.0							
112.0							
113.0							
114.0							
115.0	119817 1015 6-17-93	17 33 45	18	SAA	SW	N/A	m-tip 0.0 ppm; BX 50 cpm; α = 0 cpm
116.0							
117.0							
118.0							
119.0							
120.0							

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cobra 42

Driller: Craig Coulter, B. Lindsey

SAA - Same As Above

N/A - Not Applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

Background: m-tip = 0.0 ppm, BX = 60 cpm, α = 0 cpm

6-17-93: m-tip = 0.0 ppm, BX = 60 cpm, α = 0 cpm

090

PRELIMINARY

VISUAL CLASSIFICATION OF SOILS

470 6

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-17-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 15 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
121.0	119919 1045 6-17-93	17 33 45	18	Very Dense (5Y, 4/4) Olive, Well Graded Sand, wet	SW	N/A	m-i-p = 0.0 ppm; BZ = 70 cpm; α = 0 cpm
122.0							
123.0							
124.0							
125.0	119825 1425 6-17-93	19 33 50	18	SAA	SW	N/A	m-i-p = 0.0 ppm; BZ = 60 cpm; α = 0 cpm
126.0							
127.0							
128.0							
129.0							
130.0	119923 1505 6-17-93	39 50/4	16	Very Dense (5Y, 4/4) Olive, Well Graded Sandy Gravel, wet	GW	N/A	m-i-p = 0.0 ppm; BZ = 70 cpm; α = 0 cpm
131.0							
132.0							
133.0							
134.0							
135.0							

PRELIMINARY

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable Tool

Driller: Craig Culver

B. Lesser

SAA - Same As Above

NA - Not Applicable

Samples collected using ASTM standard penetration test

Colors identified using Munsell Color Chart

Background: m-i-p = 0.0 ppm; BZ = 60 cpm; α = 0 cpm

091

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-17-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable-Tool		PAGE 16 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
136.0	119825 1645 6-17-93	29 50/.3	9		SW	N/A	m-t.p = 0.0 ppm; BY = 50 cpm; α = 0 cpm
137.0							
138.0							
139.0							
140.0	119827 0920 6-18-93	50/4	4		GM	N/A	m-t.p = 0.0 ppm; BY = 80 cpm; α = 0 cpm
141.0							
142.0							
143.0							
144.0							
145.0	119828 1055 6-18-93	50/3	4		GM	N/A	m-t.p = 0.0 ppm; BY = 50 cpm; α = 0 cpm
146.0							
147.0							
148.0							
149.0							
150.0				Hydrofracture 500 FT			Sample #119830

PRELIMINARY

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cable-Tool

Driller: Tom Coulter

Bill Schert

SAA - Same As Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background m-t.p = 0.0 ppm; BY = 50 cpm; α = 0 cpm

6-18-93 m-t.p = 0.0 ppm; BY = 50 cpm; α = 0 cpm

VISUAL CLASSIFICATION OF SOILS — 4706

PROJECT NUMBER: 50-03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-18-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 17 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
151.0	119829 1405 6-18-93	54.3	4	Very Dense (5Y, 5/2) Olive Gray, Sandy Gravel, wet	GP	N/A	m-t.p = 0.0 ppm; BX = 60 cpm; α = 0 cpm
152.0							
153.0							
154.0							
155.0	119831 1430 6-21-93	35 43 50	12	Very Dense (5Y, 4/2) Olive Gray, Poorly Graded Gravel, wet	GP	N/A	m-t.p = 0.0 ppm; BX = 50 cpm; α = 0 cpm
156.0							
157.0							
158.0							
159.0							
160.0				Hydropunch 160.0 Ft			Sample # 119833
161.0	119832 1510 6-21-93	50/.4	5	Very Dense (5Y, 5/2) Olive Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-t.p = 0.0 ppm; BX = 40 cpm; α = 0 cpm
162.0							
163.0							
164.0							
165.0							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Craig Coulter, Bill Sibert

SAA - Same as Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Color identified using Munsell Color Chart

Background: 6-9-93 m-t.p = 0.0 ppm, BX = 50 cpm, α = 0 cpm; 6-2-93 m-t.p = 0.0 ppm, BX = 50 cpm, α = 0 cpm

PRELIMINARY

093

706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-22-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 18 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
166.0	119834 0930 6-22-93	24 26 29	11	Very Dense (5Y, 5/3) Olive, Poorly Graded Fine Sand, wet	SP	N/A	M-t.p = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm
167.0							
168.0							
169.0				Hydropunch 170.0 FT			Sample #119836
170.0	119837 1315 6-22-93	50/.4	5	SAA	SP	N/A	m-t.p = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm
171.0							
172.0							
173.0							
174.0							
175.0	119839 1425 6-22-93	26 50/.3	9	SAA	SP	N/A	m-t.p = 0.0 ppm; Bγ = 60 cpm; α = 0 cpm
176.0							
177.0							
178.0							
179.0							
180.0							

PRELIMINARY

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

Driller: Bob Johnson
John Leon

Bkgrnd
m-t.p = 0.0 ppm
6-22-93 Bγ = 60 cpm
α = 0 cpm

094

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER 50.03.22	PROJECT NAME. CRUS Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-23-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 19 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
181.0	1335 6-23-93	50/.	0	No Recovery	N/A	N/A	2 spoons driven
182.0							Rinsate # 119842
183.0							
184.0							
185.0	119843 1610 6-23-93	90 90/.2	9	Very Dense (5Y, 5/2) Olive Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm; BX = 50 cpm; α = 0 cpm
186.0							
187.0							
188.0							
189.0							
190.0				Hydropunch 190 ft			Sample # 119847
191.0	119846 0910 6-24-93	67	6	Very Dense (5Y, 4/1) Dark Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 ppm; BX = 50 cpm; α = 0 cpm
192.0							
193.0							
194.0							
195.0							

NOTES.

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: Bob Johnson

John Leon

SAA - Same As Above

NA - Not Applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Background 6-23-93: m-tip = 0.0; BX = 60; α = 0

6-24-93: m-tip = 0.0 ppm; BX = 60 cpm; α = 0 cpm

PRELIMINARY

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-24-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST. K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 20 OF 20

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
196.0	119949 1635 6-24-93	100	6	Very Dense (5Y, 4/1) Dark Gray Poorly Graded Fine Grained Sand, wet	SP	N/A	m-tip = 0.0 BY = 50 α = 0
197.0	119848 0905 6-25-93	60 46 51	18	Very Dense (5Y, 5/1) Gray Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 BY = 80 α = 0
198.0 199.0	119850 0935 6-25-93	34 74	12	Very Dense (5Y, 5/1) Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 BY = 80 α = 0
200.0	119852 1005 6-25-93	43 42 58	18	SAA	SP	N/A	m-tip = 0.0 BY = 90 α = 0 Hydropunch @ 200 FT #117356
201.0 202.0	119854 1340 6-25-93	8 18 32	18	SAA	SP	N/A	m-tip = 0.0 BY = 70 α = 0
203.0	119857 1530 6-25-93	14 25	12	Dense (5Y, 5/1) Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 BY = 50 α = 0
204.0 205.0	119859 1600 6-25-93	94	5	Very Dense (5Y, 5/1) Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-tip = 0.0 BY = 60 α = 0
206.0 207.0 208.0 209.0 210.0				Rinsate #119861 - Hydropunch		119862	

NOTES.

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Cyclone 42

Driller: Bob Johnson
Robert Quinn

SAA - Same As Above
NA - Not Applicable
Samples collected per ASTM standard penetration test
Colors identified

Background

6-24-93 m-tip = 0.0 ppm
BY = 60 cpm
α = 0 cpm

6-25-93 m-tip 0.0 ppm
BY 50 cpm
α 30 cpm

096

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU 5 Phase 2	
BORING NUMBER: 41066	COORDINATES:	DATE 6-28-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: K. Payne	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Cable Tool		PAGE 21 OF 24

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
211.0	119860 1010 6-28-93	50 45 50	18	Very Dense (5Y, 5/1) Gray, Poorly Graded Fine Sand, wet	SP	N/A	m-t.p = 0.0 BZ = 90 Z = 0
212.0							
213.0							
214.0							
215.0							
216.0	119863 0630 6-29-93	45 45 50	18	SAA	SP	N/A	m-t.p = 0.0 BZ = 60 Z = 0
217.0							
218.0							
219.0							
220.0				Bed Rock 220.0 FT			
221.0	0730 6-29-93	80/.2	0	No Recovery	N/A	N/A	
222.0							
223.0							
224.0							
225.0							

PRELIMINARY

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Cyclone 42

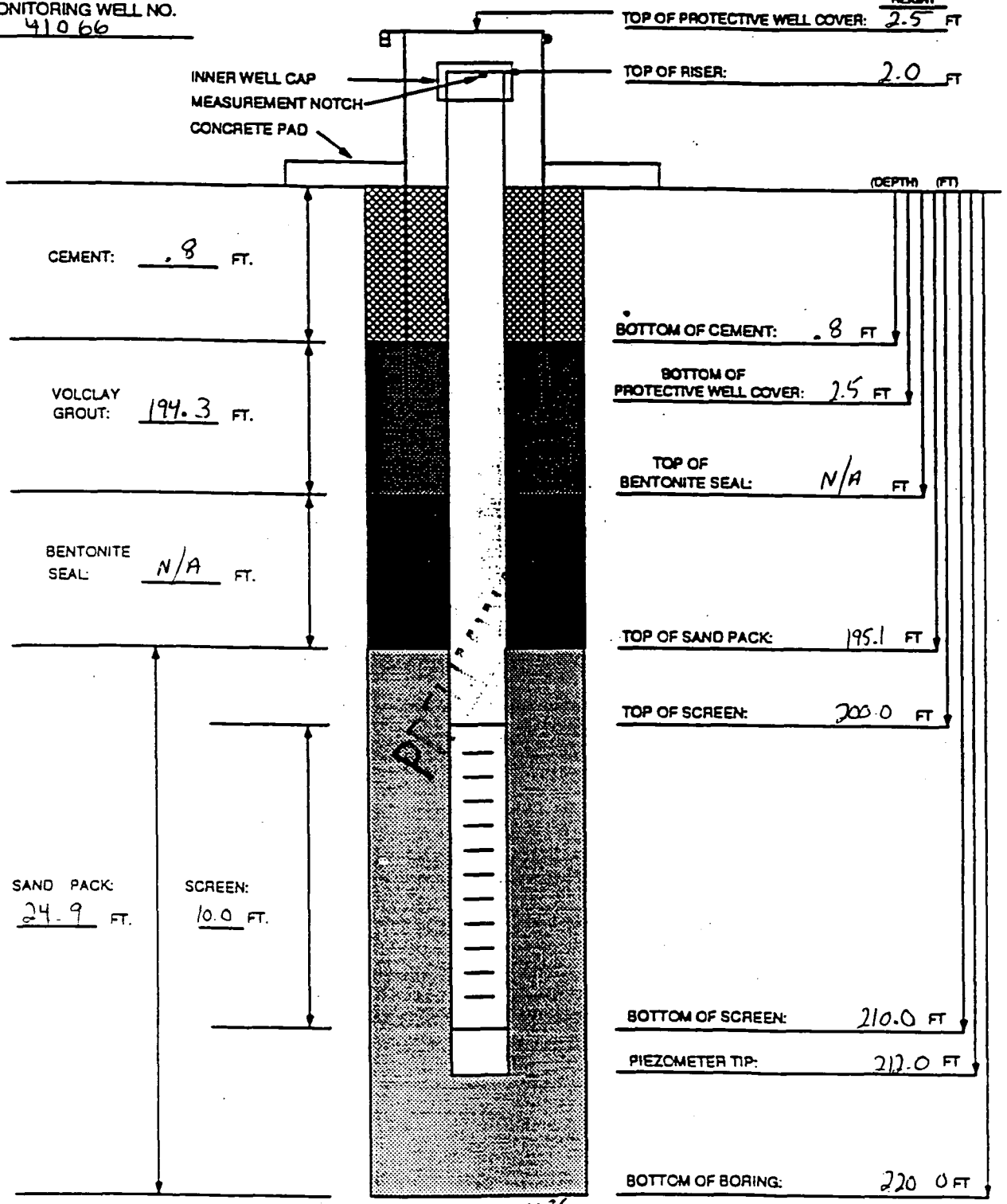
Driller: Bob Johnson, John Leon

SAA - Same As Above
NA - Not Applicable
Samples collected per ASTM standard Penetration test
Colors identified using Munsell Color Chart

Background,
6-29-93 m-t.p = 0.0 ppm, BZ = 60 cpm, Z = 0 cpm
6-29-93 m-t.p 0.0 ppm, BZ 60 cpm, Z 0 cpm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 41066

INSTALLATION DATE: 7-13-93



BOREHOLE DIAMETER: 10 3/8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: 1020 19 @ 50 lbs
BENTONITE PELLETS (5-GALLON BUCKETS): N/A
BAGS OF VOLCLAY GROUT: 49 @ 50 lbs
AMOUNT OF CEMENT: 1 bag @ 94 lbs
AMOUNT OF WATER USED: 1300 gallons
OTHER: 26 Drums Soil, 3 Drums Alconox/water
TASK: 5098.22

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 68.25 FT/ 7-12
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. Payne

ASI FORM 0157 REV (0)

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 5 Phase 2 FIELD ENG./GEO. K. Payne DATE 7-13-93
PROJECT NO. 50.03.22 CHECKED BY _____ DATE _____
BORING NO. 41066
PIEZOMETER NO. 41066 DATE OF INSTALLATION 7-13-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID Water FROM 0.0 FT TO 90.0 FT
FLUID N/A FROM N/A TO N/A

TYPE OF BIT Hammer
CASING SIZE (S) USED:
SIZE 10.0 ID FROM 0.0 FT TO 220.0 FT
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well
DIAMETER OF PERFORATED SECTION 4.0 ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS .010 IN
TOTAL PERFORATED AREA 10.0 FT

RISER PIPE MATERIAL 316 stainless steel
RISER PIPE DIAMETERS:
O.D. 4 3/8 IN I.D. 4.0 IN
LENGTH OF PIPE SECTIONS 20-10 FT, 1-2 FT
JOINING METHOD Screw type - flush joint

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0 FT
PROTECTIVE PIPE O.D. 10 3/4 IN

OTHER PROTECTION Hinged Locking Cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:	TOP 0.0 FT	BOTTOM 0.9 FT		
Cement GROUT/SLURRY	TOP 0.8 FT	BOTTOM 195.1 FT	TOP KP 7/13/93	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP 195.1 FT	BOTTOM 220.0 FT	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 200.0 FT	BOTTOM 210.0 FT	TOP	BOTTOM
PIEZOMETER TIP	212.0 FT			
BOTTOM OF BOREHOLE	220.0 FT			
GWL AFTER INSTALLATION	70.25 FT (Top Riser)			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Cement was placed from 0.0 to 0.8 ft to hold the protective cover in place.

DATE 14-JUL-93
TIME 13:19:15

RESULTS OF ANALYSIS

100

4208

PROJECT NAME/NUMBER: CRU-5 / GMR AQUIFER

SAMPLE FAMILY NUMBER: 9307011035 SAMPLE POINT: 21063 CONTACT NAME: MIKE FRANK
SAMPLING GROUP: FACILITIES CHARACTERIZATION MATERIAL NAME: M320/SOIL CHARGE NUMBER: RJB22

SAMPLE ID/ USER SAMPLE ID/ RELEASE NUMBER	STATUS/ CONDITION	DATE SAMP/ DATE RCVD	TASK ID/ LABORATORY	METHOD/OPERATION/COMPONENT	DATE TASK PERFRMED/ DUE DATE	TR	RESULTS/ UNITS	DATA QUALIFIERS	BATCH
200003344	COMPLETE	29-JUN-93	300004540	9158/DET OF PARTICLE SIZE, SIEVE METHOD	02-JUL-93	1	5		
119864	ONLINE	29-JUN-93	INORGANICS-EPM	9158/DET OF PARTICLE SIZE, 90% RETAIN	15-JUL-93		.001 inch		
1000000193				SOLID					
			300004541	9158/DET OF PARTICLE SIZE, SIEVE METHOD	02-JUL-93	1	18.00		
			INORGANICS-EPM	9158/DET OF PARTICLE SIZE, 50% RETAIN	15-JUL-93		.001 inch		
				SOLID					
			300004542	9158/DET OF PARTICLE SIZE, SIEVE METHOD	02-JUL-93	1	22.00		
			INORGANICS-EPM	9158/DET OF PARTICLE SIZE, 40% RETAIN	15-JUL-93		.001 inch		
				SOLID					

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 50,032.2	PROJECT NAME. GMR Aquifer CLU-5	
BORING NUMBER. 21065	COORDINATES:	DATE 6-10-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/ 1500	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.9 ft Date/Time 7-9-93/ 1115	DATE COMPLETED: 7-8-93
DRILLING METHODS: Cable Tool		PAGE 1 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	119895 1055 6/10/93	3	6	Very Stiff Dark Grayish Brown (10YR, 4/2) Silty Clay with Some Root Fragments, medium Plasticity, moist	CL	2.5	MT = 0 ppm Bg = 40-60 cpm α = 0 cpm
0.5	119886 1055 6/10/93	11	6	Very Stiff Dark Grayish Brown (10YR, 4/2) Silty Clay with Some Roots, medium Plasticity, moist	CL	2.5	
1.0	119887 1055 6/10/93	10	2	Very Stiff Yellowish Brown (10YR, 5/4) Silty Clay with Some Roots, medium Plasticity, slightly moist	CL	2.5	
1.5	119888 1105 6/10/93	11	6	Very Stiff Yellowish Brown (10YR, 5/4) Silty Clay with Some (10YR, 5/1) Gray mottling, medium Plasticity, moist	CL	2.25	MT = 0 ppm Bg = 40-60 cpm α = 0 cpm
2.0	119889 1105 6/10/93	12	6	Stiff SAA	CL	1.75	
2.5	N/A	12	0	No Recovery	N/A	N/A	
3.0	119890 1245 6/10/93	9	6	Stiff, Yellowish Brown (10YR, 5/6) Silty Clay with Some Gray (10YR, 6/1) mottling, medium Plasticity, slightly moist.	CL	1.0	MT = 0 ppm Bg = 40-60 cpm α = 0 cpm
3.5	119891 1245 6/10/93	10	6	SAA	CL	2.0	
4.0	119892 1245 6/10/93	8	4	SAA	CL	2.0	
4.5	119893 1250 6/10/93	7	6	Stiff Yellowish Brown (10YR, 5/6) Silty Clay with a Trace of Gravel, medium Plasticity, moist	CL	1.5	MT = 0 ppm Bg = 40-60 cpm α = 0 cpm
5.0							

NOTES

Drilling Company: Pennsylvania Drilling
Driller: Joe Barile / Dave Newman
Helper: Mike Leon

SAA - Same As Above

Background Levels
MT = 0 ppm.
Bg = 40-60 cpm
α = 0 cpm

Samples collected per ASTM Standard Penetration Test. Colors Identified using Munsell color chart.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME 6MR Aquifer CRU-5	
BORING NUMBER 21065	COORDINATES:	DATE 6-10-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93 / 1500	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.9 ft Date/Time 7-9-93 / 1115	DATE COMPLETED 7-8-93
DRILLING METHODS Cable Tool		PAGE 2 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	119894 1250 6-10-93	7	6	SAA	CL	2.0	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
5.5	119895 1250 6-10-93	9	6	SAA	CL	2.0	
6.0	119896 1300 6-10-93	8	6	Soft, Yellowish Brown (10YR, 5/4) Silty clay, medium Plasticity, moist	CL	0.5	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
6.5	119897 1300 6-10-93	9	6	Hard, Yellowish Brown, (10YR, 5/4) Silty clay, medium Plasticity, moist	CL	4.5	
7.0	119898 1300 6-10-93	11	6	Stiff, Yellowish Brown (10YR, 5/4) Silty clay with Gray (10YR, 6/1) mottling medium Plasticity, moist	CL	1.5	
7.5	119899 1305 6-10-93	7	6	Soft, Grayish Brown (10YR, 5/2) Very silty clay with Gray (10YR, 6/1) mottling, medium Plasticity	CL	0.5	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
8.0	119900 1305 6-10-93	10	6	Stiff SAA.	CL	1.0	
8.5	119901 1305 6-10-93	13	6	Stiff SAA	CL	1.0	
9.0	119902 1310 6-10-93	7	6	Soft, Gray (10YR, 6/1) Very silty clay, medium Plasticity, moist to wet	CL	0.5	MT = 0 ppm BY = 40-60 cpm α = 0 cpm
9.5	119903 1310 6-10-93	10	6	SAA	CL	0.75	
10.0							

NOTES

See Page 1

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FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS — 4706

PROJECT NUMBER. 50.03.22	PROJECT NAME. 6MR Aquifer CAU-5	
BORING NUMBER. 21065	COORDINATES:	DATE 6-10-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST Ken Geiger (Petrilly)	Depth 54.4 ft Date/Time 7-9-93/1115	DATE COMPLETED: 7-8-93
DRILLING METHODS Cable Tool		PAGE 3 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0	119904 1310 6-10-93	10	6	SAA	CL	0.5	MT = 0 ppm; BX = 40-60 cpm; α = 0 cpm
10.5	119905 1330 6-11-93	3	6	SOFT (10 YR 5/1) GRAY, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	0.5	MT = 0 ppm; BX = 60/80 cpm; α = 0 cpm
11.0	119906 1330 6-11-93	4	6	STIFF SAA	CL	1.5	
11.5	119907 1330 6-11-93	6	5	STIFF SAA	CL	1.5	
12.0	119908 1345 6-11-93	3	6	SOFT (10 YR 5/4) YELLOWISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	0.5	MT = 0 ppm; Bα = 60-80 cpm; α = 0 cpm
12.5	119909 1345 6-11-93	10	6	SAA	CL	0.5	
13.0	NA 1345 6-11-93	12	0	NO RECOVERY	NA	NA	
13.5	119910 1355 6-11-93	5	6	STIFF (10 YR 5/4) YELLOWISH BROWN SANDY - SILTY CLAY, LOW TO MEDIUM PLASTICITY, MOIST	CL	2.0	MT = 0 ppm; Bα = 60/80 cpm; α = 0 cpm
14.0	119911 1355 6-11-93	9	5	SOFT (10YR 5/1) GRAY, SILT CLAY WITH TRACE OF ORGANIC (ROOTLETS), LOW TO MEDIUM PLASTICITY, MOIST	CL	0.5	
14.5	NA 1355 6-11-93	9	0	NO RECOVERY	NA	NA	
15.0							

NOTES

See page 1

Background Levels
MT = 0 ppm
BX = 40-60 cpm
α = 0 cpm

PRELIMINARY

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FERNALD
RI/FS

47 VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME GMR Aquifer CRU-5		
BORING NUMBER 21065	COORDINATES:	DATE 6-11-93	
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED 6-10-93	
ENGINEER/GEOLOGIST Ken Gazzik	Depth 54.8 ft Date/Time 7-9-93/	DATE COMPLETED 7-8-93	
DRILLING METHODS Cable Tool		PAGE 4 OF 15	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	119912 1420 6-11-93	3	6	SOFT (10YR 5/1) GRAY, SILTY CLAY LOW TO MEDIUM PLASTICITY, MOIST	CL	0.5	MT = 0 ppm BY = 60-80 cpm α = 0 cpm
15.5	119913 1420 6-11-93	7	6	SAA	CL	0.5	
16.0	NA 1420 6-11-93	9	0	NO RECOVERY 6-11-93	NA	NA	
16.5	119914 1435 6-11-93	3	6	SOFT (10YR 5/1) GRAY, SANDY-SILTY CLAY, WITH TRACE OF GRAVEL, MEDIUM PLASTICITY, MOIST	CL	0.5	MT = 0 ppm BY = 60-80 cpm α = 0 cpm
17.0	119915 1435 6-11-93	10	6	SOFT (10YR 5/1) GRAY, SANDY-SILTY CLAY, WITH SOME GRAVEL, MEDIUM PLASTICITY, MOIST.	CL	0.5	
17.5	NA 1435 6-11-93	10	0	NO RECOVERY	NA	NA	
18.0	119916 1445 6-11-93	8	6	STIFF SAA	CL	1.5	MT = 0 ppm BY = 60-80 cpm α = 0 cpm
18.5	119917 1445 6-11-93	11	5	STIFF SAA	CL	1.5	
19.0	1445 6-11-93	14	0	NO RECOVERY	NA	NA	
19.5	119918 0920 6-14-93	11	6	STIFF, DARK GREY (2.5Y 4/1), SILTY CLAY WITH SOME GRAVEL, MEDIUM PLASTICITY SLIGHTLY MOIST	CL	1.5	MT/P = 0 ppm BY = 40-60 cpm α = cpm
20.0							

NOTES

See Page 1

BACKGROUND LEVELS 6-11-93
MT = 0 ppm
BY = 60 cpm
α = 0 cpm

Background levels 6-10-93
MT = 0 ppm
BY = 60 cpm
α = 0 cpm

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22-	PROJECT NAME: GMR Aquifer CRU-5		
BORING NUMBER: 21065	COORDINATES:	DATE: 6-19-93	
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.34 ft Date/Time 7-6-93/1415	DATE COMPLETED 7-8-93	
DRILLING METHODS: CABLE TOOL		PAGE 5 OF 15	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.0	119919 0920 6-19-93	28	6	HARD SAA	CL	4.5	
20.5	119920 0920 6-19-93	34	6	HARD SAA	CL	4.5	
21.0	119921 0950 6-19-93	33	6	HARD, DARK GREY (2.5 Y 4/1), SANDY SILTY CLAY WITH SOME GRAVEL, LOW TO MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	4.5	MT = 0 PPM Bγ = 40-60 CPM α = 0 PPM
21.5	119922 0950 6-19-93	36	6	SAA	CL	4.5	
22.0	119923 0950 6-19-93	50	6	SAA	CL	4.5	
22.5	119924 1325 6-19-93	29	6	VERY STIFF SAA	CL	3.5	MT = 0 PPM Bγ = 40-60 CPM α = 0 CPM
23.0	119925 1325 6-19-93	37	6	DENSE, YELLOWISH BROWN (10YR 5/4), FINE GRAINED, POORLY GRADED SAND, WITH SOME GRAVEL, DRY	SP	NA	
23.5	NA 1325 6-19-93	50	0	NO RECOVERY	NA	NA	
24.0	NA	NA	NA	NO SAMPLE TAKEN, SAMPLES TO BEGIN AT 25.0 FEET, AT 5.0 FOOT INTERVALS.	NA	NA	NA

NOTES

SEE PAGE 1

BACKGROUND LEVELS MT = 0 PPM
Bγ = 40-60 CPM
α = 0 CPM

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.22	PROJECT NAME GMR Aquifer CRU-5	
BORING NUMBER 21065	COORDINATES:	DATE 6-14-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1100	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.5 ft Date/Time 7-8-93/1115	DATE COMPLETED 7-8-93
DRILLING METHODS Cable Tool		PAGE 6 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
25.0 26.5	119926 1355 6-14-93	29 50/2	8	Very Dense, Dark Grayish Brown (10YR4/2) well Graded sand with Some Gravel, Slightly Moist	SW	N/A	MT = 0 ppm BT = 40-60 cpm α = 0 cpm
30.0 31.5	119927 1420 6-14-93	28 50/2	8	SAA	SW	N/A	MTIP = 0 ppm BT = 40-60 cpm α = 0 cpm
35.0 36.5	~~Not used~~ ~~119924~~ 119928 1355 6-15-93	50/4	2	SAA	SW	N/A	MT = 0 ppm BT = 40-60 cpm α = 0 cpm
40.0							

PRELIMINARY

NOTES

See Page 1

Background Levels
6-14-93
MT = 0 ppm
BT = 40-60 cpm
α = 0 cpm

Background Levels
6-15-93
MT = 0 ppm
BT = 40-60 cpm
α = 0 cpm

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER 50.03.22	PROJECT NAME GMR Aquifer CAU-5		
BORING NUMBER 21065	COORDINATES:	DATE 6-15-93	
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED 6-10-93	
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.9 ft Date/Time 7-9-93/1115	DATE COMPLETED 7-8-93	
DRILLING METHODS Cable Tool		PAGE 7 OF 15	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
40.0	~~119930~~ 119929 1435 6-15-93	44 50/4	7	Very Dense, Brown (10YR 5/3) Poorly Graded Fine Sand, with a Trace of Gravel, Dry	SP	N/A	MT = 0ppm BY = 40-60cpm L = 0cpm
41.5							
45.0	119930 1650 6-15-93	50 50/1	2	Very Dense, Brown (10YR, 5/3) Well Graded, Gravelly Sand, Dry	SW	N/A	MT = 0ppm BY = 40-60cpm L = 0cpm
46.5							
50.0	119931 0925 6-16-93	18 50/3	6	Very Dense, Brown (10YR 4/3) Poorly Graded Fine Sand with a Trace of Gravel + Rock Fragments, Slightly moist	SP	N/A	MT = 0ppm BY = 40-60cpm L = 0cpm Rinsate Sample #119932
51.5	119933 1035 6-16-93	50/4	4	Very Dense, Dark Grayish Brown (10YR 4/2) Well Graded Gravelly Sand, Slightly moist	SW	N/A	MT = 0ppm BY = 40-60cpm L = 0cpm
53.0	119934 1055 6-16-93	50 50/3	7	Very Dense, Dark Grayish Brown (10YR, 4/2) Well Graded Gravelly Sand, Wet	SW	N/A	MT = 0ppm BY = 40-60cpm L = 0cpm
54.5	~~119935~~ 6-16-93						

NOTES:

See Page 1

Background Levels 6-15-93
MT = 0ppm
BY = 40-60cpm
L = 0cpm

Background Levels 6-16-93
MT = 0ppm
BY = 40-60cpm
L = 0cpm

PRELIMINARY

402-11-86

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 50 03 22	PROJECT NAME. GMR Aquifer CAU-5	
BORING NUMBER. 21065	COORDINATES:	DATE 6-16-93
ELEVATION:	GWL: Depth 530 ft Date/Time 6-21-93/1300	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.5 ft Date/Time 7-9-93/1115	DATE COMPLETED: 7-8-93
DRILLING METHODS. Cable Tool		PAGE 3 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
54.5	119935 1110 6-16-93	24 50/3	8	Very Dense, Dark Grayish Brown (10YR, 4/2) well Graded Gravelly Sand, wet	SW	N/A	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
56.0	119936 1345 6-16-93	16 30 50	13	Very Dense Dark Grayish Brown (10YR, 4/2) well Graded Sand with Some Gravel, wet	SW	N/A	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
57.5	119937 1355 6-16-93	7 12 24	10	Dense Dark Grayish Brown (10YR, 4/2) well Graded Sand with Some Gravel, wet	SW	N/A	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
59.0	119938 1410 6-16-93	10 18 19	12	Dense Dark Gray (10YR 4/1) poorly Graded Fine Sand with Some Gravel, wet	SP	N/A	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
60.5	119939 1435 6-16-93	6 8 9	6	Medium Dense SAA	SP	N/A	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
62.0	119941 1540 6-21-93	30 39 50/5	15	Very Dense, Dark Gray (10YR, 4/1) well Graded Sand with Some Gravel, wet	SW	NA	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm Hydropunch Sample # 119940 62.0'
63.5	119942 1630 6-21-93	19 37 50/5	16	Very Dense, Dark Gray (10YR, 4/1) well Graded ~~Sand~~ Gravelly Sand with Some Rock Fragments, wet	SW	NA	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm Composite Sieve Sample II 119944
65.0	119943 1650 6-21-93	26 33 50/5	17 ~~18~~ 16 6-21-93	SAA	SW	NA	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
66.5							
69.5							

NOTES

See Page 1

Background Levels 6-16-93
MT = 0 ppm
BJ = 40-60 cpm
L = 0 cpm

Background Levels 6-21-93
MT = 0 ppm
BJ = 40-60 cpm
L = 0 cpm

402-11-86

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50 03 22	PROJECT NAME: GMR Aquifer Clu-5	
BORING NUMBER: 21065	COORDINATES:	DATE: 6-22-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 50.55 Date/Time 7-8-93/1115	DATE COMPLETED: 7-8-93
DRILLING METHODS: Cable Tool		PAGE 9 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
69.5							
70.0	119945 910 6-22-93	7 12 14	14	Medium Dense, Dark Gray (10YR, 4/1) Well Graded Sand with Some Gravel, wet	SW	NA	MT = 0 ppm Bg = 40-60 cpm L = 0 cpm
71.5							Hydropunch Sample #119946 73.0'
75.0	119947 1430 6-22-93	13 26 50	18	Very Dense, Dark Gray (10YR, 4/1) Well Graded Gravelly Sand, wet	SW	NA	MT = 0 ppm Bg = 40-60 cpm L = 0 cpm
76.5							
80.0	119948 1500 6-22-93	7 12 13	18	Medium Dense, Dark Gray (10YR, 4/1) Well Graded Gravelly Sand, wet	SW	NA	MT = 0 ppm Bg = 40-60 cpm L = 0 cpm
81.5							Hydropunch Sample #119949 83.0'
84.5							

PRELIMINARY

NOTES

See Page 1

Background Levels
MT = 0 ppm
Bg = 40-60 cpm
L = 0 cpm

402-11-86

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER: 50.03.22	PROJECT NAME: GMR Aquifer CRU5	
BORING NUMBER: 21065	COORDINATES:	DATE: 6-23-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 54.8 ft Date/Time 7-8-93/1115	DATE COMPLETED: 7-8-93
DRILLING METHODS: Cable Tool		PAGE 10 OF 15

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
84.5							
85.0	119950 0930 6-23-93	18 50/4	7	Very Dense, Dark Gray (10YR, 4/1) well Graded Sand with Some Gravel, wet	SW	NA	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
86.5							
90.0	119951 1025 6-23-93	5 9 13	6	Medium Dense, Dark Gray (10YR, 4/1) well Graded Gravel with Some Sand, wet	GW	NA	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
91.5							Hydropunch Sample # 119952 93.0'
95.0	119953 1455 6-23-93	6 29 40	9	Very Dense, Dark Gray (10YR, 4/1) well Graded Sand with Some Gravel, wet	SW	NA	MT = 0 ppm BJ = 40-60 cpm L = 0 cpm
96.5							
99.5							

NOTES:

See Page 1

Background Levels
MT = 0 ppm
BJ = 40-60 cpm
L = 0 cpm

402-11-86

FERNALD RI/FS

47

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 50.03.22	PROJECT NAME. GMR Aquifer CRU-5	
BORING NUMBER. 21065	COORDINATES.	DATE 6-23-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1500	DATE STARTED 6-10-93
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.94 ft Date/Time 7-9-93/1115	DATE COMPLETED: 7-9-93
DRILLING METHODS Cable Tool		PAGE 11 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
99.5							
100.0	119954 1530 6-23-93	11 14 13	18	Medium Dense, Dark Gray (10YR, 4/1) Well Graded Sand with Some Gravel, WET	SW	NA	MT = 0 ppm Bγ = 40-60 cpm α = 0 cpm
101.5							Hydropunch at 103.0' Sample #119955
105.0	119956 1425 6-24-93	8 13 23	18	Dense, Dark Gray (10YR, 4/1) Poorly Graded medium Sand with Some Gravel, WET	SP	NA	MT = 0 ppm Bγ = 40-60 cpm α = 0 cpm
106.5							
110.0	119957 1545 6-24-93	5 8 11	18	Medium Dense Very Dark Gray (10YR, 3/1) Well Graded Sand with Some Gravel, WET	SW	NA	MT = 0 ppm Bγ = 40-60 cpm α = 0 cpm
111.5							Hydropunch at 113.0' Sample #119958
114.5							

NOTES

See Page 1

Background Levels 6-23-93
MT = 0 ppm
Bγ = 40-60 cpm
α = 0 cpm

Background Levels 6-24-93
MT = 0 ppm
Bγ = 40-60 cpm
α = 0 cpm

PRELIMINARY

4C2-11-86

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: 64R Aquifer CRU-5	
BORING NUMBER: 21065	COORDINATES:	DATE 6-25-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93 / 1500	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST Ken Geiger	Depth 54.84 Date/Time 7-9-93 / 1115	DATE COMPLETED: 7-8-93
DRILLING METHODS: Cable Tool		PAGE 12 OF 15

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
114.5 115.0	119959 1015 6-25-93	32 43 50	12	Very Dense, Dark Gray (10YR 4/1) Poorly Graded Fine Sand with Some Gravel, wet	SP	NA	mT = 0 ppm BT = 40-60 cpm L = 0 cpm
116.5							
120.0	119960 1045 6-25-93	5 6 12	14	medium Dense SAA	SP	NA	mT = 0 ppm BT = 40-60 cpm L = 0 cpm
121.5							Hydropunch at 123.0' Sample # 119961
125.0	119962 1555 6-25-93	20 28 43	18	Very Dense, Dark Gray (10YR 4/1) Poorly Graded, Fine Sand with Some Gravel, wet	SP	NA	mT = 0 ppm BT = 40-60 cpm L = 0 cpm
126.5							
129.5							

NOTES

See Page 1

Background Levels
mT = 0 ppm
BT = 40-60 cpm
L = 0 cpm

402-11-86

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER: 50.0322	PROJECT NAME: GMR Aquifer CRU-5	
BORING NUMBER: 21065	COORDINATES:	DATE: 6-25-93
ELEVATION:	GWL: Depth 53.0 ft Date/Time 6-21-93/1300	DATE STARTED: 6-10-93
ENGINEER/GEOLOGIST: Ken Geiger	Depth 54.84 ft Date/Time 7-9-93/1105	DATE COMPLETED: 7-8-93
DRILLING METHODS: Cable Tool		PAGE 13 OF 15

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
129.5							
130.0	119963 1645 6-25-93	18 21 40	18	Very Dense, Dark Gray (10YR 4/1) Poorly Graded Fine Sand with Some Gravel, wet	SP	NA	MT = 0ppm BG = 40-60cpm L = 0cpm
131.5				Bottom of Boring at 131.5'			Hydropunch at 133.0 ft Sample # 119964 Rinsate Sample # 119965

PRELIMINARY

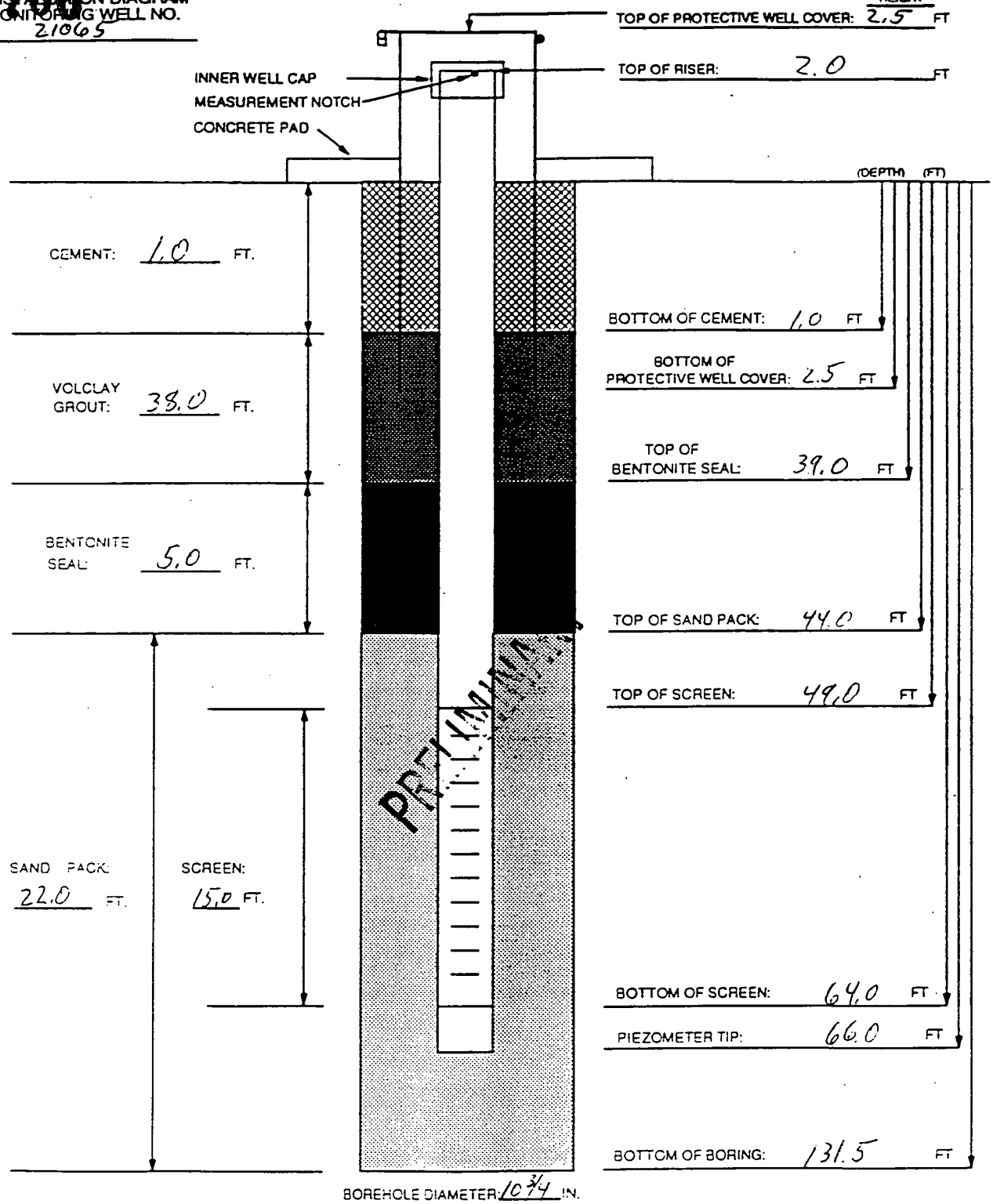
NOTES

See Page 1

Background Levels
MT = 0ppm
BG = 40-60cpm
L = 0 cpm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 21065

INSTALLATION DATE: 7-8-93



	HEIGHT	(DEPTH) (FT)
TOP OF PROTECTIVE WELL COVER:	2.5 FT	
TOP OF RISER:	2.0 FT	
BOTTOM OF CEMENT:		1.0 FT
BOTTOM OF PROTECTIVE WELL COVER:		2.5 FT
TOP OF BENTONITE SEAL:		39.0 FT
TOP OF SAND PACK:		44.0 FT
TOP OF SCREEN:		49.0 FT
BOTTOM OF SCREEN:		64.0 FT
PIEZOMETER TIP:		66.0 FT
BOTTOM OF BORING:		131.5 FT

MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 40 - 50 lb Bags
BENTONITE PELLETS (5-GALLON BUCKETS): 6 Buckets
BAGS OF VOLCLAY GROUT: 8 Bags 50 lb Pack
AMOUNT OF CEMENT: 2 Bags
AMOUNT OF WATER USED: 500 gallons
OTHER: 1-15' Screen with 2' Sump, 5-10', 1-1' Sections
TASK: 50.03.22

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 54.3 FT. 7-8-93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: Ken Geiger

Bottom of Boring at 131.5'. Boring Allowed To Collapse To 66.0'

ASI FORM 0157 REV. 10/91

PIEZOMETER INSTALLATION SHEET

PROJECT NAME 6MR Aquifer
PROJECT NO. 5a of 22
BORING NO. 21065
~~PIEZOMETER~~ MONITORING WELL NO. 21065 MGT-1-93

FIELD ENG./GEO. Ken Geiger DATE 7-9-93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 7-9-93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Hammer Percussion Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID Water FROM 0.0' TO 55.0'	SIZE 10" FROM 0.0' TO 130.0'
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4.0 I.D.	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8 in I.D. 4.0 in
SLOTS [X] HOLES [ ] SCREEN [ ]	LENGTH OF PIPE SECTIONS 5-10', 1-1' Sections 1-15' Screen with 2' Sump
AVERAGE SIZE OF PERFORATIONS .010"	JOINING METHOD Screw Type - Flush
TOTAL PERFORATED AREA 15.0'	Joint Threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'	OTHER PROTECTION Hinged Well Cover
PROTECTIVE PIPE O.D. 10 3/4 in	with Lock

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 39.0	TOP	BOTTOM
BENTONITE	TOP 39.0	BOTTOM 44.0	TOP	BOTTOM
SAND	TOP 44.0	BOTTOM 66.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 49.0	BOTTOM 64.0	TOP	BOTTOM
PIEZOMETER TIP	66.0			
BOTTOM OF BOREHOLE	131.5			
GWL AFTER INSTALLATION	54.3			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]
REMARKS Bottom of Boring at 131.5'. Boring Allowed to Collapse to 66.0'

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER SD.03.18 ~~26.03.05~~ VT 7/12 | PROJECT NAME. CRUS SOUTHEAST QUADRANT

BORING NUMBER. PA-SD-08 | COORDINATES. | DATE 7/12/93

ELEVATION: | GWL: Depth NA Date/Time | DATE STARTED 7/12/93

ENGINEER/GEOLOGIST V. TAPPA | Depth Date/Time | DATE COMPLETED. 7/12/93

DRILLING METHODS HOLLOW STEM AUGER & SPLIT SPOON (3-IN.) | PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	121651, 121652, 7-12-93 0930	3	6	(10YR, 4/2) sandy clay, dark grayish brown, stiff, low plasticity, moist	CL	1.75	BACKGROUND MT = 0.0 ppm
1	121653 7-12-93 0930	4	6	SAA	CL	1.75	MT = 0.0 ppm
	121655, 121656, 121657 7-12-93 0930	4	6	(10YR, 4/3) sandy clay, brown, stiff, low plasticity, moist	CL	1.5	BG = 60-70 cpm
2	121658 7-12-93 1000	11	6	SAA	CL	2.0	MT = 0.0 ppm
	121659 7-12-93 1000	10	6	(10YR, 5/3) sandy clay, brown, stiff, med. plasticity, moist	CL	1.0	BG = 60-70 cpm
3	121660, 121661, 121662 7-12-93 1000	11	6	SAA	CL	1.5	
	121663 7-12-93 1020	3	6	SAA	CL	.75	MT = 0.0 ppm
4	121664 7-12-93 1020	8	6	(2.5Y, 5/4) sandy clay, lt. olive brown, very soft, high plasticity, wet	VT 7/12 ~~SC~~ CL	<.25	
	121665 7-12-93 1020	10	6	SAA	VT 7/12 ~~SC~~ CL	<.25	BG = 60-70 cpm
5	121666, 121667, 121668 7-12-93 1020	14	6	SAA (2.5Y, 5/4) clay, lt. olive brown, stiff, med. plasticity, moist	VT 7/12 ~~CLSC~~ CL	<.25 1.5	
6							
7							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ALVER SOIL SENTRY

Driller JOE RABB

JAMES ANDERSON

SAA - Same as above

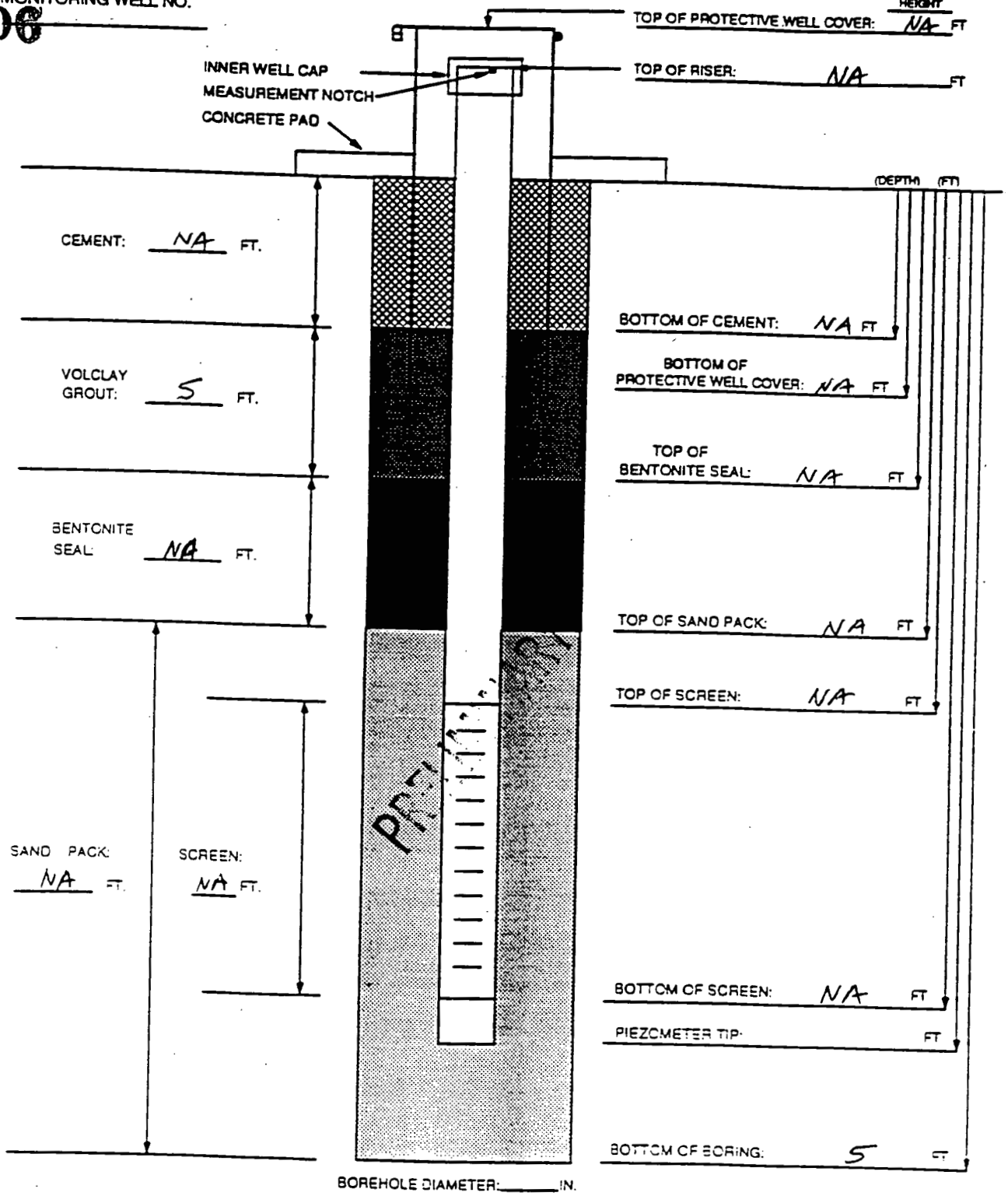
NA - Not Applicable

Samples collected per ASTM standard penetration

Colors identified using Munsell color chart

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4706

INSTALLATION DATE: PA-SD-08



BOREHOLE DIAMETER: _____ IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 50lb. BAG
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED:
OTHER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT. NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. TAPPA

FORM 0167 REV. 0

FERNALD
RI/FS

4706
P. 3 OF 3

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS SOUTHEAST QUAD. FIELD ENG./GEO. K. TAPPA DATE 7-12-
PROJECT NO. 50.03.18 CHECKED BY DATE
BORING NO. PA-SD-08
PIEZOMETER NO. NA DATE OF INSTALLATION 7-12-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0 FT	BOTTOM 5.0 FT	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP ↕	BOTTOM ↕
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	5 FT			
GWL AFTER INSTALLATION	DRY			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐

REMARKS

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~20-03-03~~ 20-03-18 KT 7/13	PROJECT NAME. CRUS SOIL BORING/SAMPLING		
BORING NUMBER PA-SD-05	COORDINATES.		DATE 7-13-93
ELEVATION:	GWL: Depth NA Date/Time		DATE STARTED 7-13-93
ENGINEER/GEOLOGIST K. TAPPA	Depth Date/Time		DATE COMPLETED. 7-13-93
DRILLING METHODS SPLIT SPOON - HOLLOW STEM AUGER			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (USE)	REMARKS
	0915 7-13-93	10	6	COAL	NA	NA	MT = ~~0.0~~ 2.5 ppm (KT 7/13)
1	0915 7-13-93	17	6	COAL	NA	NA	MT = 3.5 ppm (KT 7/13)
	1000 0915 7-13-93	12	6	(5Y, 4/2) clay, DK gray, with some gravel, stiff, low plasticity, moist	CL	1.75	βγ = 160-180 cpm
2	1000 7-13-93	12	6	SAA	CL	1.5	MT = 3.0 ppm
	1000 7-13-93	15	6	(5Y, 5/1) clay, gray with mottling, with some gravel (coarse) hard, low plasticity, moist	CL	>4.5	βγ = 160-180 cpm
3	1000 7-13-93	27	6	SAA	CL	3.25	
	1015 7-13-93	27	6	SAA	CL	>4.5	MT = 4.0 ppm
4	1015 7-13-93	49	6	(2.5, 5/4) clay, pale olive brown, with some gravel, very stiff, low plasticity, moist	CL	3.25	
	1015 7-13-93	48	6	SAA	CL	1.25	βγ = 160-180 cpm
5	1015 7-13-93	50	6	SAA	CL	1.5	
6							
7							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ACKER SOIL SENTRY

Driller JOE RABB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard procedures
Colors identified using Munsell

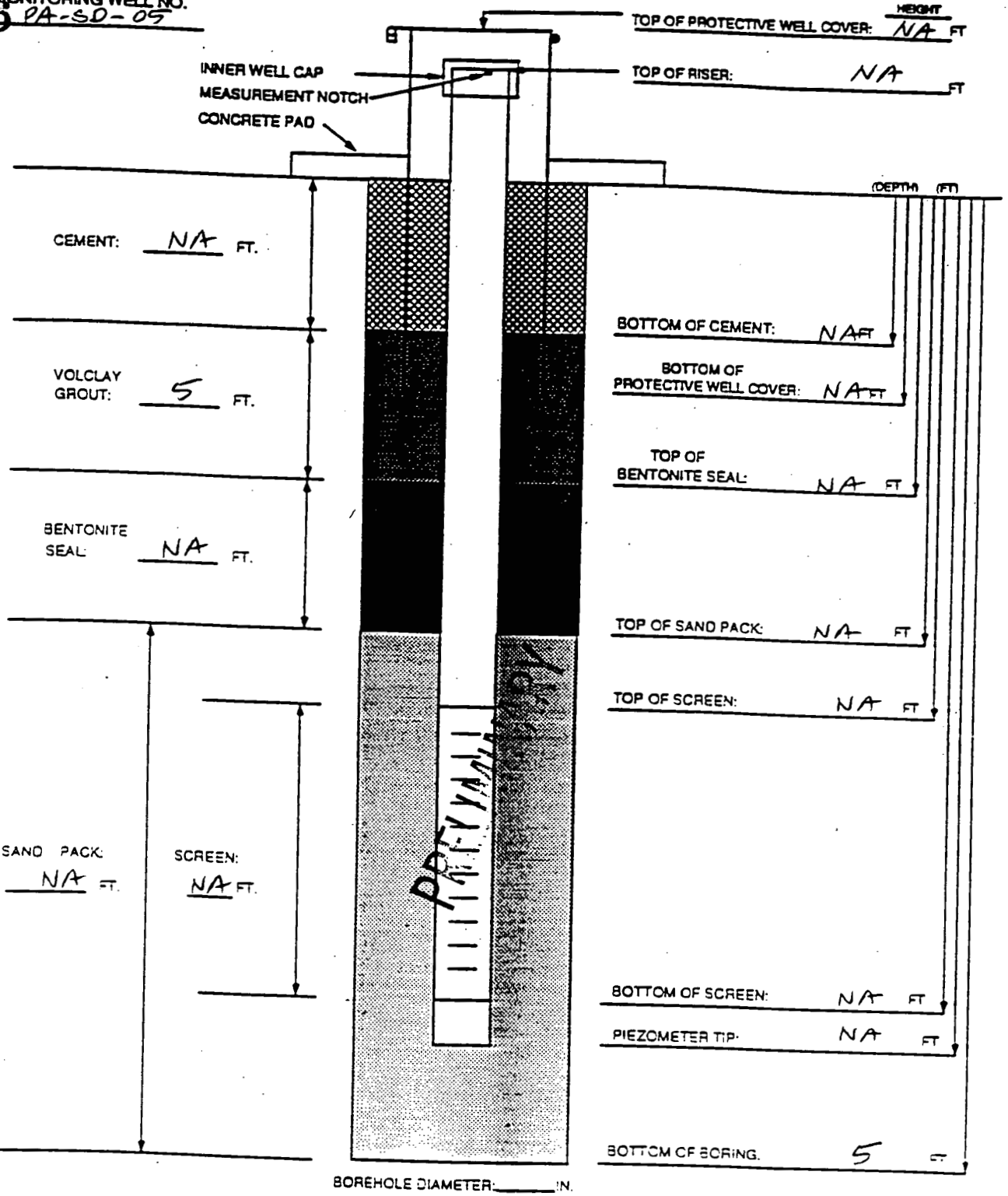
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. PA-SD-05

4706

INSTALLATION DATE: 7-13-93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: _____ IN.

MATERIALS USED

AND TYPE AND QUANTITY: NA
ENTONITE PELLETS (5-GALLON BUCKETS): NA
AGS OF VOLCLAY GROUT 1 50 LB BAG
MOUNT OF CEMENT NA
MOUNT OF WATER USED: NA
THER:
ASK 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE NA FT NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: K. TAPPA

FORM NET REV. 1

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU5 SOIL BORING/SAMPLING
PROJECT NO. 50.03.18
BORING NO. PA-SO-05
PIEZOMETER NO. NA
FIELD ENG./GEO. V. TAPPA
CHECKED BY
DATE 7-13-
DATE
DATE OF INSTALLATION 7-13-93

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:			NA	
GROUT/SLURRY	TOP 0.0 FT	BOTTOM 5.0 FT	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	5.0 FT		NA	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER SD. 03.18	PROJECT NAME CRU 5		
BORING NUMBER 11088	COORDINATES		
ELEVATION	GWL. Depth	Date/Time	DATE 7-9-93
ENGINEER/GEOLOGIST PAT RILEY	Depth	Date/Time	DATE STARTED 7-9-93
DRILLING METHODS AUGER (→ USING CME)			DATE COMPLETED 7-10-93
			PAGE 1 OF 4

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	121151 121152 121153 1000 7-9-93	NA	6	VERY STIFF, DARK GRAYISH BROWN (10 YR 4/2), SANDY CLAY WITH TRACE OF GRAVEL, LOW TO MEDIUM PLASTICITY DRY, SOME COAL CHUNKS TAL #1	CL	3.0	MT = 0.4 ppm BG = 120 CPM
0.5	121154 1000 7-9-93	↑	6	SAA	CL	3.0	MT = 0.4 ppm BG = 170 CPM
1.0	121155 121156 1000 121157 7-9-93		6	SAA TAL #2	CL	3.0	MT = 0.4 ppm BG = 170 CPM
1.5	121158, ~~121159~~ 1145 7-9-93		6	VERY STIFF, VERY DARK BROWN, (10 YR 2/2) SILTY CLAY, WITH TRACE OF GRAVEL, MEDIUM PLASTICITY, DRY	CL	3.5	MT = 0.4 ppm BG = 190 CPM
2.0	121159 1145 7-9-93		6	SAA	CL	4.0	
2.5	121160, 121161, 121162 1145 7-9-93		6	SAA TAL #3	CL	4.0	
3.0	121163 0740 7-10-93		6	VERY STIFF, VERY DARK GRAY (2.5Y 3/1) SILTY CLAY, WITH SOME GRAVEL, MED. PLASTICITY, DRY	CL	2.5	MT = 3.2 ppm BG = 150 CPM
3.5	121164 0740 7-10-93		6	VERY STIFF, ~~LIGHT BROWNISH GRAY OLIVE YELLOW (2.5Y 6/6)~~ (2.5Y 6/2) SILTY CLAY, MOTTLED OLIVE YELLOW (2.5 6/6) MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	2.5	MT = 0.5 ppm BG = 150 CPM
4.0	121165 0740 7-10-93	↓	6	SAA	CL	2.5	
4.5	121166 0740 7-10-93	NA	6	SAA MOIST	CL	2.0	MT = 0.0 ppm BG = 150 CPM

DRILLING FIRM: PENNSYLVANIA DRILLING
DRILLERS: JEFF BENTLEY, MIKE LITTLETON
RIG TYPE: AUGER → CME
COLOR DESCRIPTION BASED ON MUNSELL

UNITS MEASURED: MICROTIP = ppm BG = CPM

BACKGROUND READINGS:
MICROTIP: 0.2 ppm
BG: 150 CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

PRELIMINARY

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FERNALD
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME GRU 5		
BORING NUMBER B11088	COORDINATES		
ELEVATION	GWL. Depth	Date/Time	DATE 7-10-93
ENGINEER/GEOLOGIST RILEY	Depth	Date/Time	DATE STARTED 7-9-93
DRILLING METHODS AUGER → (USING CME)			DATE COMPLETED 7-10-93
			PAGE 2 OF 4

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	121167 0790 7-10-93	NA	6	SAA	CL	2.0	
5.5	121168 0740 7-10-93		6	SAA	CL	2.0	
6.0	121169 121170 121171 0830 7-10-93		6	SAA TAL #4	CL	2.0	MT = 0.0 PPM BG = 150 CPM
6.5	121172 0830 7-10-93		6	STIFF, LIGHT BROWNISH GRAY (2.5Y 6/2) WITH MOTTLED OLIVE YELLOW (2.5Y 6/6) SANDY CLAY, WITH SOME GRAVEL, MEDIUM TO HIGH PLASTICITY, WET.	CL	1.5	
7.0	121173 0830 7-10-93	NA	6	SOFT, LIGHT BROWNISH GRAY (2.5Y 6/2) CLAYEY SAND, WITH GRAVEL, WELL GRADED, WET	SC	NA	
7.5	121174 0930 7-10-93	NA	6	SAA	SC	NA	MT = 0.0 PPM BG = 150 CPM
8.0	121175 0930 7-10-93		6	HARD, LIGHT YELLOWISH BROWN (2.5Y 6/3), SILTY CLAY WITH SOME GRAVEL MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	4.5	
8.5	121176 0930 7-10-93	NA	6	SAA	CL	4.5	
9.0							MT = PPM BG = CPM
9.5							

DRILLING FIRM: PENNSYLVANIA DRILLING
DRILLERS: JEFF BENTLEY, MIKE LITTLETON
RIG TYPE: AUGER USING CME
COLOR
DESCRIPTION BASED ON MUNSELL

UNITS MEASURED: MICROTIP = PPM, BG = CPM

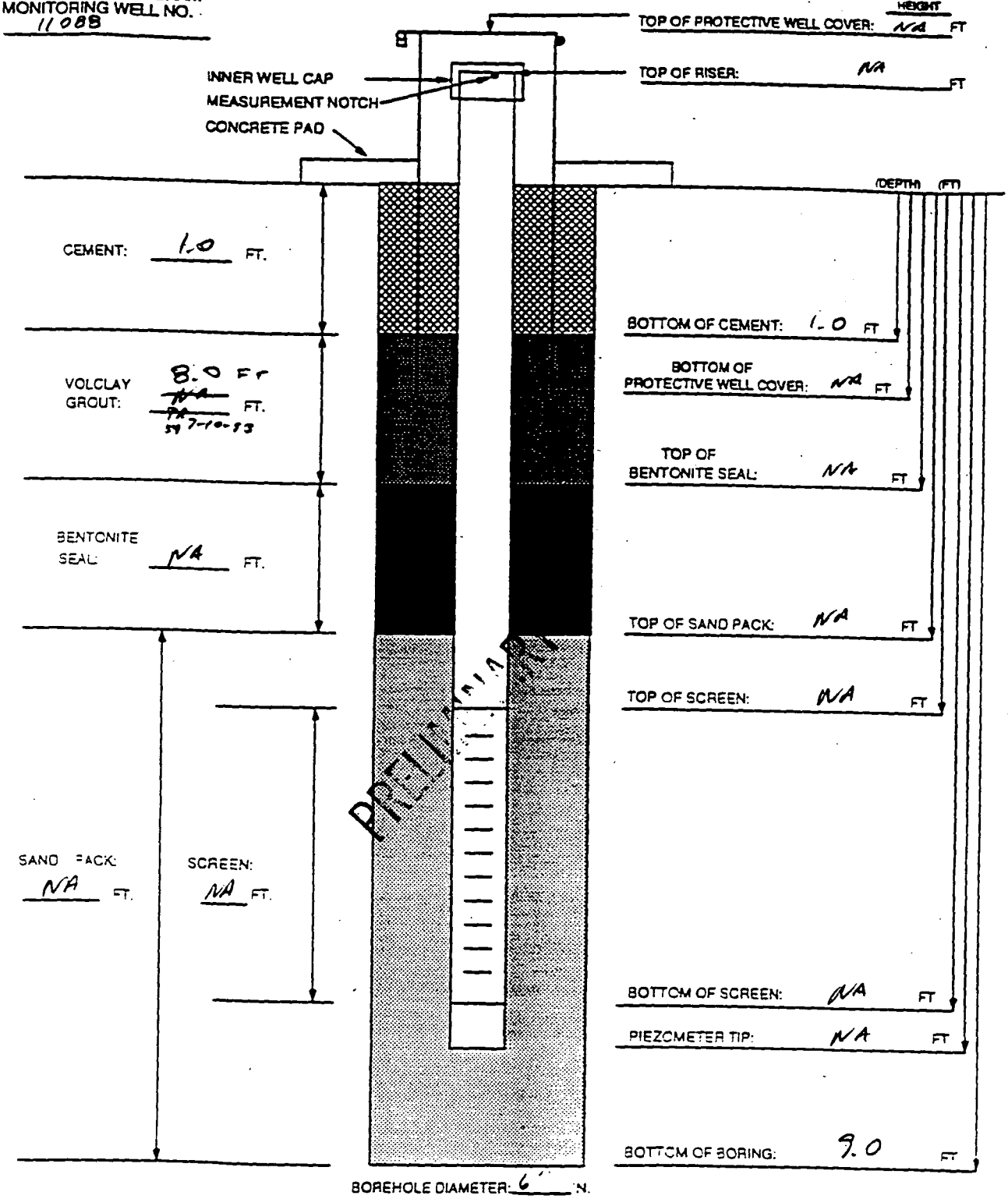
BACKGROUND READINGS:
MICROTIP: 0.0 PPM
BG: 150 CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

PRELIMINARY

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1108B

INSTALLATION DATE: 7-10-93



BOREHOLE DIAMETER: 6 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3 BAGS
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 10 GALLONS
OTHER: NA
TASK: WBS 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 6.5 FT 7-10-
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: RILEY

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 5 FIELD ENG./GEO. RILEY DATE 7-10-
PROJECT NO. WBS 50.03.18 CHECKED BY _____ DATE _____
BORING NO. 11088
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	0.0	1.0		
CONCRETE GROUT/SLURRY	TOP 1.0	BOTTOM 9.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	NA			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☒

REMARKS BORED TO A T.D. OF 9.0 FT, GROUTED UP TO 1.0 FT, POURED CONCRETE CAP.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~20.03.05~~ 20.03.22 VT 7/9	PROJECT NAME. CRU 5 ADD'L MON-WELL INSTALLATION		
BORING NUMBER. 11080	COORDINATES.		DATE 7/9/93
ELEVATION:	GWL: Depth DRY	Date/Time 7/11/93	DATE STARTED 7/9/93
ENGINEER/GEOLOGIST K. TAPPA	Depth	Date/Time	DATE COMPLETED.
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	119311 0055 7-9-93	13	6	(10YR 5/3) sandy clay, brown, low plasticity, dry, very stiff	CL	3.0	MT = 0.0 ppm background βγ = 40-60 cpm background
	119312 0055 7-9-93	10	6	SAA	CL	3.0	MT = 0.0 ppm βγ = ~~0-5~~ 40-60 cpm VT 7/9
	119313 0055 7-9-93	20	6	SAA	CL	3.0	
2	119314 0705 7-9-93	10	6	SAA moist	CL	>4.5 VT 7/9	MT = 0.0 ppm
	119315 0705 7-9-93	11	6	SAA	CL	1.0	βγ = ~~0-5~~ 40-60 cpm VT 7/9
3	NA 0705 7-9-93	14	0	NR	NA	NA	
4	119316 0715 7-9-93	8	6	(10YR 5/3) sandy clay, brown, low plasticity, stiff, moist	CL	1.0	MT = 0.0 ppm
	119317 0715 7-9-93	11	6	SAA	CL	3.0	βγ = ~~0-5~~ 40-60 cpm VT 7/9
	119318 0715 7-9-93	17	6	SAA	CL	2.75	
5	119319 0730 7-9-93	10	6	SAA	CL	3.5	MT = 0.0 ppm
	119320 0730 7-9-93	9	6	SAA	CL	3.75	βγ = 40-60 cpm
	119321 0730 7-9-93	8	6	(10YR 5/3) clayey sand, brown, no plasticity, loose, moist	SC	3.75	
6	119322 0800 7-9-93	5	6	(2.5YR 5/4) sandy clay, lt. olive brown, low med. plasticity, moist, soft	CL	.5	MT = 0.0 ppm
7	119323 0800 7-9-93	5	6	SAA	CL	VT 7/9 ~~1~~ 1.5	βγ = 40-60 cpm
	NA 0800 7-9-93	8	0 VT 7/9	NR	NA	NA ~~2.0~~ VT 7/9	

NOTES:

Drilling Contractor Pennsylvania Drilling
Drilling Equipment AUGER SOIL SENTRY
Driller JOE RABB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable
NR - No Recovery

Samples collected per ASTM standard practice
Colors identified using Munsell Color Chart

PRELIMINARY

FERRALLOY
RI/FS 4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER SD.03.22	PROJECT NAME. CRUS ADD'L - MON - WELL INSTALLATION	
BORING NUMBER 11080	COORDINATES.	DATE 7/9/93
ELEVATION:	GWL: Depth DRY Date/Time 7/11/93	DATE STARTED 7/9/93
ENGINEER/GEOLOGIST K-TAPPA	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS HOLLOW STEM AUGER		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	119324 0805 7-9-93	5	6	(2.5Y, 4/4) sandy clay with some gravel, olive brown, low plasticity, moist, very stiff.	CL	2.5	MT = 0.0ppm
	119325 0805 7-9-93	8	6	SAA	CL	1.5	BZ = 40-60 cpm
	119326 0805 7-9-93	12	6	(2.5Y, 4/4) clay with little sand, olive brown, med. to high plasticity, moist, soft	CL	.5	
9	119270 0825 7-9-93	4	6	(2.5Y, 4/4) clay (sandy), olive brown, low plasticity, moist, very stiff	CL	2.5	MT = 0.0 ppm
	119271 0825 7-9-93	6	6	SAA	CL		
10				gravel, coarse, well-graded, loose, moist	GP	NA	BZ = 40-60ppm
	NA 0825 7-9-93	4	0	NR	NA	NA	
11	119272 0830 7-9-93	4	6	(10YR, 4/6) sand, dark-yellowish brown, well-graded, loose, sub-angular, moist	SW	NA	MT = 0.0ppm
	119273 0830 7-9-93	17	6	SAA	SW	NA	BZ = 40-100 ppm
	119274 0830 7-9-93	14	6	(2.5Y, 4/1) clay, dark gray, low plasticity, moist, hard	CL	>4.5	
12							
13							
14							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment AVER SOIL SENTRY

Driller JOE RABS

JAMES ANDERSON

SAA - Same as above

NA - Not Applicable

NR - No Recovery

Samples collected per ASTM standard sampling [illegible]

Colors [illegible] using Munsell [illegible]

FERNALD RI/FS

44706
3 OF 4

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS ADD'L. MON. WELL INSTALLATION FIELD ENG./GEO. K. TAPPA DATE 7/10/9
PROJECT NO. 50.03.22 CHECKED BY _____ DATE _____
BORING NO. 11080
PIEZOMETER NO. 11080 DATE OF INSTALLATION 7/9/93 - 7/

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED: NA
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4-IN
PERFORATION TYPE:
SLOTS [✓] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS 0.010
TOTAL PERFORATED AREA 2 FEET

RISER PIPE MATERIAL STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 1/4 IN. I.D. 4 IN.
LENGTH OF PIPE SECTIONS 2', 5', 4'2"
JOINING METHOD FLUSH-THREAD JOINTS

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 FT
PROTECTIVE PIPE O.D. 12-in.
OTHER PROTECTION LOCK

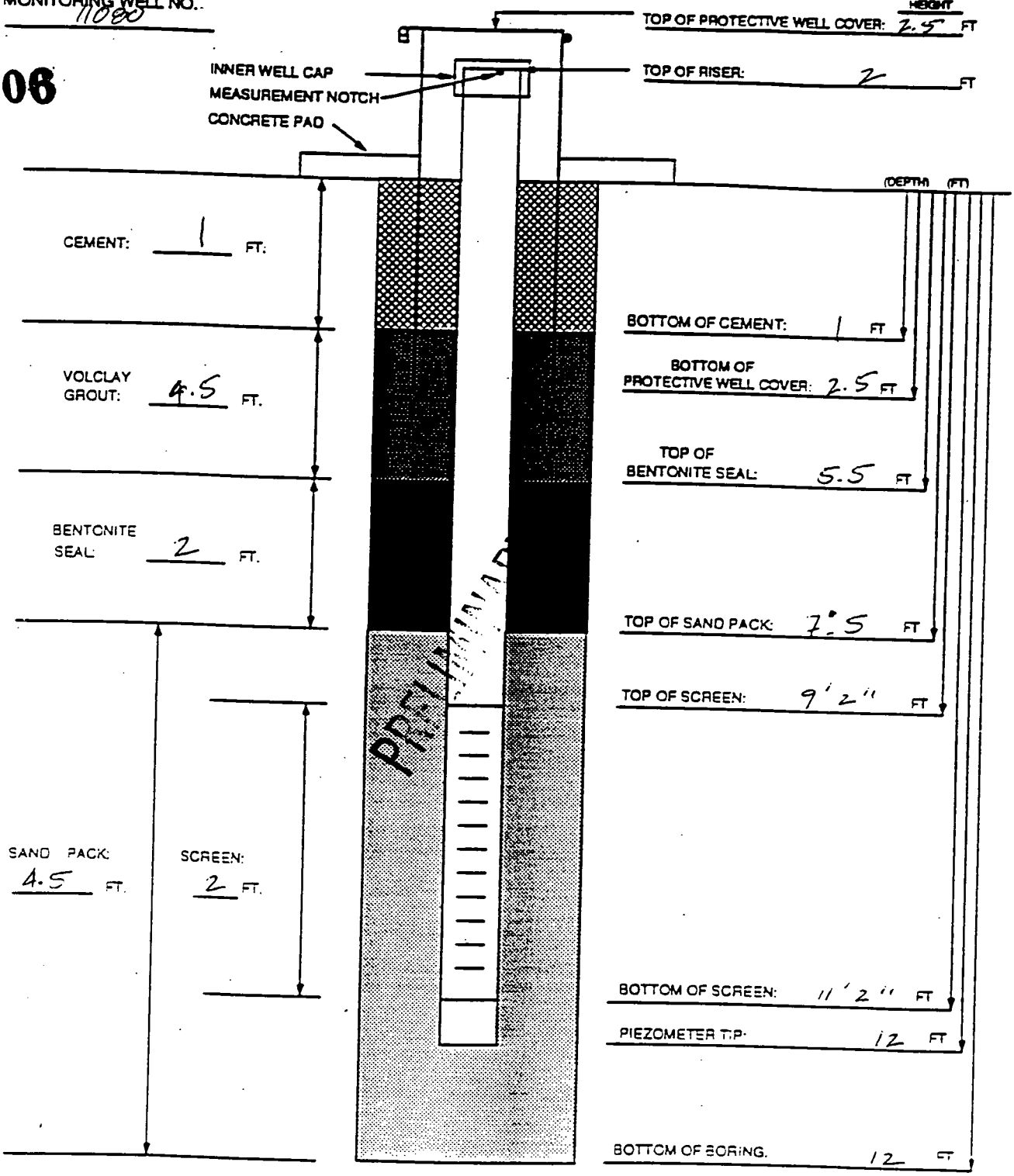
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	2.5 FT		NA	
GROUND SURFACE	0.0		↕	
BOTTOM OF PROTECTIVE PIPE	2.5 FT		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 5.5	TOP NA	BOTTOM NA
BENTONITE	TOP 5.5	BOTTOM 7.5	TOP ↑	BOTTOM ↑
SAND	TOP 7.5	BOTTOM 12.0	TOP	BOTTOM
7/10 ~~GRAVEL~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP ↓	BOTTOM ↓
PERFORATED SECTION	TOP 9'2"	BOTTOM 11'2" 7/10	TOP NA	BOTTOM NA
PIEZOMETER TIP	12 FT.			
BOTTOM OF BOREHOLE	12 FT			
GWL AFTER INSTALLATION	DRY			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [ ]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [ ]
REMARKS _____

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1100

INSTALLATION DATE: _____

4706



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NO. 7 4 BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF VOLCLAY GROUT: 2 50 LB. BAGS
AMOUNT OF CEMENT: 1 50 LB. BAG
AMOUNT OF WATER USED: 30 GALS
OTHER: NONE
TASK: SD 03.22

NOTES:

1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE DRY FT: 7/10
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: K. TAPPA

FORM 0151 REV. 0

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER: 50.03.22	PROJECT NAME: Additional Monitoring Well Installation		
BORING NUMBER: #11068	COORDINATES:	DATE: 6-29-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 6-29-9	
ENGINEER/GEOLOGIST: T. Layne	Depth / Date/Time	DATE COMPLETED: 7-1-9	
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 8	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (NO.)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	~~109135~~ 119002 0945 6-29-93	3	6.0 inches	Very Soft (10YR5/6) yellowish Brown Silt, poorly graded gravel, trace sand DRY	ML	>0.1	microtip = 0.0 ppm By = BG
0.5	~~109136~~ 119003 0945 6-29-93	5	2.0	SAA	ML	>0.1	SAA
			4.0	Very Hard (10 YR 4/3) Dark Brown Silty Clay, organics (roots) DRY	CL	<4.5	SAA
1.0	N/A	9	N/A	No Recovery	N/A	N/A	N/A
1.5	~~109137~~ 119004 1010 6-29-93	8	6.0	Very stiff (10 YR 6/2) Light Brownish Gray, Clay mottled w/ (10 YR 5/6) yellowish Brown, Silty Clay MOIST	CL	2.5	microtip = 0.0 ppm By = BG
2.0	~~109138~~ 119005 1010 6-29-93	10	6.0	SAA but, DRY	CL	2.5	SAA
2.5	N/A	12	N/A	No Recovery	N/A	N/A	N/A
3.0							

NOTES

Drilling Contractor: Penn Drill
Drilling Equipment: Mobile B-80
Driller: Bob Erickson
Helper: Richard Thomas
* Samples collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 60-100 cpm
Microtip = 0.0 ppm

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

4708

PROJECT NUMBER: 50.03.22	PROJECT NAME: Additional Monitoring Well Installatio		
BORING NUMBER: #11068	COORDINATES:	DATE: 6-29-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 6-29-9	
ENGINEER/GEOLOGIST: T. Layne	Depth / Date/Time	DATE COMPLETED: 7-1-	
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 6	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3.0	~~109139~~ 119006 1020 6-29-93	TL 7-7-93 10	2.0 inches	Very Soft (10 YR 6/1) Lt. Gray Silty Clay, trace sand, mottled w/ (10YR 5/6) Yellowish Brown Silty Clay WET	CL	<.5	microtip = 0.0 ppm Bg = BG
			4.0	SAA but Very Stiff MOIST	CL	2.0	SAA
3.5	~~109140~~ 119007 1020 6-29-93	TL 7-7-93 10	6.0	SAA	CL	2.0	SAA
4.0	N/A	10		No Recovery	N/A	N/A	N/A
4.5	~~109141~~ 119008 1030 6-29-93	TL 7-7-93 9	2.0	Stiff (10YR 5/4) Yellowish Brown Sandy Clay WET	CL	1.2	microtip = 0.0 pp Bg = BG
			4.0	SAA, but mottled w/ (5YR 5/8) Yellowish Red. Clay MOIST	CL	1.2	SAA
5.0	~~109142~~ 119009 1030 6-29-93	TL 7-7-93 7	1.0	SAA	CL	1.2	SAA
			5.0	Very Stiff (10 YR 5/4) Grayish Brown. Silty Clay	CL	2.5	SAA
5.5	~~109143~~ 119010 1030 6-29-93	TL 7-7-93 11	6.0	SAA	CL	2.5	SAA
6.0							

PRELIMINARY

NOTES
Drilling Contractor: Penn Drill
Drilling Equipment: Mobile B-80
Driller: Bob Erickson
Helper: Richard Thomas
* Samples collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
Bg = 40-100 cpm
Microtip = 0.0 ppm

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: Additional Monitoring Well Installation	
BORING NUMBER: #11068	COORDINATES:	DATE: 6-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-29-9
ENGINEER/GEOLOGIST: T. Layne	Depth Date/Time	DATE COMPLETED: 7-1-9
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 8

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
6.0	~~109144~~ 119011 1311 6-29-93	R 7-7-93 5	2.0 inches	Very Soft (10YR 5/6) yellowish Brown, Sandy Clay WET	CL	<.5	Microtip = 0.0 ppm By = BG
6.5			4.0	Very Stiff (10YR 5/1) Gray Silty Clay, poorly graded small gravel MOIST	CL	2.25	SAA
	~~109145~~ 119012 1311 6-29-93	R 7-7-93 8	4.0	SAA	CL	2.25	SAA
7.0			2.0	SAA but WET	CL	2.25	SAA
	~~109146~~ 119013 1311 6-29-93	R 7-7-93 9	2.0	SAA	SAA	SAA	SAA
7.5	~~109147~~ 119014 1320 6-29-93	R 7-7-93 10	2.0	Very Soft (10YR 5/6) yellowish Brown Sandy Clay WET	CL	<.5	Microtip = 0.0 ppm By = BG
8.0			4.0	Very Stiff (10YR 5/1) Gray Clay, trace gravel, trace Sand MOIST	CL	2.5	SAA
	~~109148~~ 119015 1320 6-29-93	R 7-7-93 10	1.0	SAA	CL	2.5	SAA
8.5			5.0	Very Loose (10YR 5/6) yellowish Brown SAND w/ well-graded gravel WET	SM	N/A	SAA
9.0	119016 1320 6-29-93	R 7-7-93 11	4.0	Stiff (10YR 4/2) Dark Grayish Brown, Silty Clay, trace of well-graded gravel, trace of sand MOIST WET AT BOTTOM	CL	1.5	SAA

NOTES

Drilling Contractor: Penn Drill
Drilling Equipment: Mobile B-80
Driller: Bob Erickson
Helper: Richard Thomas
* Samples collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By =
Microtip =

PRELIMINARY

FERNALD RI/FS

4706 VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: Additional Monitoring Well Installation	
BORING NUMBER: #11068	COORDINATES:	DATE: 6-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-29-93
ENGINEER/GEOLOGIST: T. Layne	Depth Date/Time	DATE COMPLETED: 7-1-93
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6,N)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0	119017 1340 6-29-93	5	1.0	Soft (10 YR 5/3) Brown Clayey Silt DRY	ML	.5	microtip = 0.0 ppm By = BG
9.5			5.0	Very Hard (10 YR 4/1) Dark Gray, Silty Clay, trace of well-graded gravel MOIST	CL	3.5	SAA
	119018 1340 6-29-93	7	2.0	SAA	CL	3.5	SAA
10.0			1.0	Very Loose (10 YR 4/1) Dark Gray Silty SAND, trace of Poorly-graded small gravel WET	SM	N/A	SAA
	N/A	9	N/A	No Recovery	N/A	N/A	N/A
NEW DAY 10.5	119019 0620 6-30-93	5	6.0	Loose (10 YR 5/1) Gray Sand, med to coarse grained, well-graded gravel - angular WET	SM	N/A	microtip = 0.0 ppm By = BG
11.0	119020 0620 6-30-93	8	5.0	SAA	SAA	SAA	SAA
11.5	N/A	3	N/A	No Recovery	N/A	N/A	N/A
12.0							

NOTES

Drilling Contractor: Penn Drill
Drilling Equipment: Mobile B-80
Driller: Bob Erickson
Helper: Richard Thomas
* Samples collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 40-100 ppm
Microtip = 0.0 ppm

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: Additional Monitoring Well Installati	
BORING NUMBER: # 11068	COORDINATES:	DATE: 6-30-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-29-9
ENGINEER/GEOLOGIST: T. Layne	Depth Date/Time	DATE COMPLETED: 7-1-
DRILLING METHODS: Hollow Stem Auger		PAGE 5 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
12.0	119021 0630 6-30-93	5	6.0 inches	SAA	SAA	SAA	Microtip = 1.8 ppm By = BG
12.5	119022 0630 6-30-93	5	3.0 3.0	SAA Very Stiff (10 YR 5/1) Gray Silty Clay w/ trace well graded gravel, trace sand WET	SAA CL	SAA 2.5	SAA SAA
13.0	~~109156~~ 119023 0630 6-30-93	T2 7-7-93 3	1.0 N/A	SAA No Recovery	SAA N/A	SAA N/A	SAA N/A
13.5	119024 0645 6-30-93	4	6.0	Loose (10 YR 5/1) Gray Sand, well-graded angular & subangular gravel, sand is coarse-grained WET	SM	N/A	Microtip = 1.8 ppm By = BG
14.0	119025 0645	4	5.0 1.0	SAA Soft (10 YR 5/1) Gray Sandy Clay, well graded gravel WET	SAA CL	SAA .5	SAA SAA
14.5	119026 0645 6-30-93	6	4.0 2.0	SAA SAA but Very MOIST	SAA SAA	SAA SAA	SAA SAA
15.0							

NOTES

Drilling Contractor Penn Drill
Drilling Equipment Mobile B-80
Driller: Bob Erickson
Helper: Richard Thorau
* Samples collected per ASTM Standard Penetration Test
* All colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 40-80 cpm
Microtip = 2.0 ppm

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.22	PROJECT NAME: Additional Monitoring Well Installation	
BORING NUMBER: #11068	COORDINATES:	DATE: 6-30-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6-29-93
ENGINEER/GEOLOGIST: T. Layne	Depth Date/Time	DATE COMPLETED: 7-1-93
DRILLING METHODS: Hollow Stem Auger		PAGE 6 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0	119985 0728	5	2.0	SAA but WET	CL	.5	microtip = 1.1 ppm By = BG
15.5	6-30-93		4.0	Very Hard (10YR 5/1) Gray Sandy Clay, fine grained, trace gravel WET	CL	3.0	SAA
	119986 0728	25	2.0	SAA	SAA	SAA	SAA
16.0	6-30-93		3.0	VERY Hard (10YR 5/1) Gray Silty Clay, large angular gravel MOIST TO DRY	CL	>4.5	SAA
			1.0	NO RECOVERY	N/A	N/A	N/A
16.5	N/A	40	N/A	No Recovery	N/A	N/A	N/A

NOTES

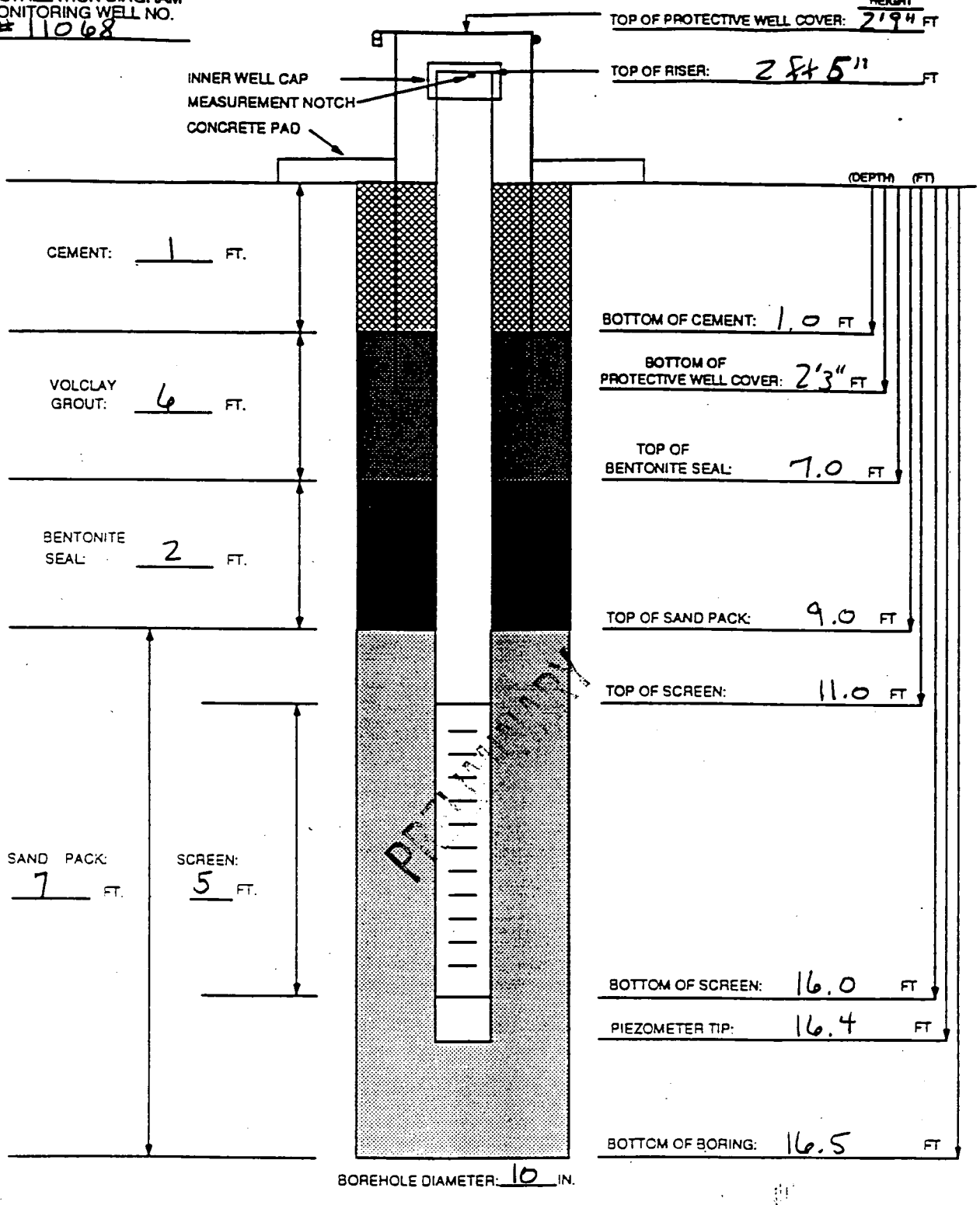
Drilling Contractor: Penn Drill
Drilling Equipment: Mobile B-80
Driller: Bob Erickson
Helper: Richard Thomas
* Samples collected per ASTM Standard Penetration Test
# All colors identified by the Munsell Color Chart

SAA = Same As Above
N/A = Not Applicable

Background
By = 40-100 ppm
Microtip = 1.1 ppm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. #1068

INSTALLATION DATE: 7-1-93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: #7 4½ bags (50lb)
BENTONITE PELLETS (5-GALLON BUCKETS): 2 buckets
BAGS OF VOLCLAY GROUT: 2½ bags
AMOUNT OF CEMENT: ½ bag
AMOUNT OF WATER USED: 15 gallons
OTHER:
TASK: 50.03.22

NOTES:

1) RISER PIPE IS 4½" IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.

GEOLOGIST/ENGINEER: T. Layne

4) WATER DEPTH AND DATE 8.2 FT. 7-2-93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

RI/FS
[redacted]4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Additional Monitoring Well Installation FIELD ENG./GEO. T. Layne DATE 7-1-
PROJECT NO. 50.03.22 CHECKED BY _____ DATE _____
BORING NO. # 11068
~~PIEZOMETER~~ Monitoring Well NO. # 11068 DATE OF INSTALLATION 7-1-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger	TYPE OF BIT Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL stainless steel
DIAMETER OF PERFORATED SECTION 4"	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 5/8 inch I.D. 4 1/4 inch
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS 10 ft, 2 ft 8"
AVERAGE SIZE OF PERFORATIONS 0.010	JOINING METHOD Johnson threaded
TOTAL PERFORATED AREA 5 ft.	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 13 ft.	OTHER PROTECTION Hinged Protective
PROTECTIVE PIPE O.D. 10" 7/8"	Steel Cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	P 2'5"		N/A	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2'3"			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 ft.	BOTTOM 7.0 ft	TOP	BOTTOM
BENTONITE	TOP 7.0 ft.	BOTTOM 9.0 ft.	TOP	BOTTOM N/A
SAND	TOP 9.0 ft.	BOTTOM 16.5 ft	TOP N/A	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP 11.0 ft.	BOTTOM 16.0 ft.	TOP	BOTTOM
PIEZOMETER TIP	16.4 ft.			
BOTTOM OF BOREHOLE	16.5 ft.			
GWL AFTER INSTALLATION	8.2 ft. on 7-2-93			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS Well was initially drilled w/ 4 1/4 inch auger, then reamed out w/ 10" auger — wooden plug was used to prevent soil from moving up auger as hole was reamed.

409

137

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU-5		
BORING NUMBER. 11076	COORDINATES:		DATE 7-1-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-1-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-1-93
DRILLING METHODS 6¼" Hollow Stem Auger			PAGE 1 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	0721 119434 119435	5 4 5	6 6 0	very STIFF (2.5Y, 4/3) olive brown, silty clay no plasticity, DRY	CL	3.5	HT = 0.0 ppm Bg = 40-60 cpm
1.5	0726 119436 119437	8 4 6	6 6 0	very STIFF (2.5Y, 5/4) light olive brown, silty clay, low plasticity, DRY	CL	2.5	HT = 0.0 ppm Bg = 40-60 cpm
3.0	0729 119438 119439	9 9 10	6 3 0	Very stiff (2.5Y, 3/2) very DARK grayish brown, silty clay, low to medium plasticity, DRY	CL	2.0	HT = 0.0 ppm Bg = 40-60 cpm
4.5	0733 119440 119441	2 3 3	6 6 0	STIFF (2.5Y, 5/4) light olive brown, silty clay medium to high plasticity, DRY	CL	1.5	HT = 0.0 ppm Bg = 40-60 cpm
6.0	0741 119442	2 2 1	6 0 0	STIFF (2.5Y, 4/4) olive brown, silty clay medium plasticity, DRY.	CL	1.5	HT = 0.0 ppm Bg = 40-60 cpm
7.5	0747 119443 119444	2 2 2	6 6 0	STIFF (2.5Y, 3/2) very DARK grayish brown silty clay, gravel pebbles, medium plasticity, DRY	CL	1.5	HT = 0.0 ppm Bg = 40-60 cpm
9.0							

NOTES

Drilling Company - Pennsylvania Drilling Company
Driller - Mike Bentley
Assistant - Bill Hutchison
Rig: Mobile B-80

Background - HT = 0.0 ppm
Bg = 40-60 cpm

2" Split Spoon driven by ASTM Standards

4700

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU-5		
BORING NUMBER. 11076	COORDINATES:	DATE 7-1-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-1-93	
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-1-93	
DRILLING METHODS 6 1/4" Hollow Stem Auger		PAGE 2 OF 3	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
9.0	0752	1	6	SOFT, (10YR 3/4), DARK yellowish brown			NT = 0.0 ppm
	119445			Silty clay, medium plasticity, moist			Bg = 500 cpm
	119446	1	6		CL	.5	
	119447	1	6				
10.5							
		1	6	SOFT (10YR, 3/4) DARK YELLOWISH BROWN SILTY CLAY, medium plasticity, moist Bands 1/16" thick of yellow white material.			NT = 3.3 ppm
	0809				CL	.5	Bg = 5000 cpm
	119448	1	6				
	119449	0	0	VERY DENSE (2.5Y 5/4) LIGHT OLIVE BROWN, very fine GRAINED SAND, DRY, POORLY GRADED 11.0	SC	NA	
12.0				NO RECOVERY BOTTOM 11.5			
	0816	1	6	MEDIUM DENSE (2.5Y 4/2) ~~DARK GRAYISH BROWN~~ olive brown CFC 7-1-93			NT 0.0 ppm
	119450			Clayey silt, DRY			Bg = 80 100 cpm
	119451	6	6		ML	NA	
	119452	10	2				
13.5							
	0821	8	6	MEDIUM DENSE (2.5Y 4/2) DARK GRAYISH BROWN Clayey silty GRAVEL CLASTS, DRY			NT = 0.0 ppm
	119453						Bg = 60 100 cpm
	119454	6	6		ML	NA	
	119455	8	2				
15.0							
	0831	3	6	HARD (2.5Y 5/6) LIGHT OLIVE BROWN, Silty clay GRAVEL CLASTS, NO PLASTICITY, DRY			NT = 0.0 ppm
	119456	5	6		CL	4.5	Bg = 40-60 cpm
	119457	8	0				
16.5							
	0841	3	6	VERY STIFF (2.5Y 4/4) OLIVE BROWN, SILTY CLAY GRAVEL CLASTS, low plasticity, DRY			NT = 0.0 ppm
	119458						Bg = 40-60 cpm
	119459	6	6		CL	2.5	
	119460	10	2				
18.0							

NOTES

Drilling Company - Pennsylvania Drilling Company

Driller - Mike Bentley

Assistant - B.K. Anderson

Rig - Mobile 80

Background -
NT = 0.0 ppm
Bg = 40-60 cpm

NA - Not Applicable

2" split spoon driven by ASTM standards

RI/FS

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. 50:03.22	PROJECT NAME. CRU-5		
BORING NUMBER. 11076	COORDINATES.		DATE 7-1-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-1-93
ENGINEER/GEOLOGIST D. Costello	Depth	Date/Time	DATE COMPLETED: 7-1-93
DRILLING METHODS 6¼" Hollow Stem Auger			PAGE 3 OF 3

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
18.0	0858			STIFF (2.5Y5/4) light olive brown, silty clay			
	119461	4	6	granic clasts, low plasticity, DRY	CL	2.0	HT = 0.0 ppm
	119462	6	6				Bg = 40-60 cpm
	119463	10	6				
19.5							
				VERY STIFF, (2.5Y5/6) light olive brown,			
	0907	3	6	silty clay, no plasticity, DRY			HT = 0.0 ppm
	119464	9	6		CL	3.0	Bg = 40-60 cpm
	119465						
21.0	119466	11	6				
21.5	119467	13	6				
TD				Total Depth 21.5'			

NOTES

Drilling Company - Pennsylvania Drilling Company

Driller - Mike Bentley

Assistant - B.W. Anderson

Rig Mobile 80

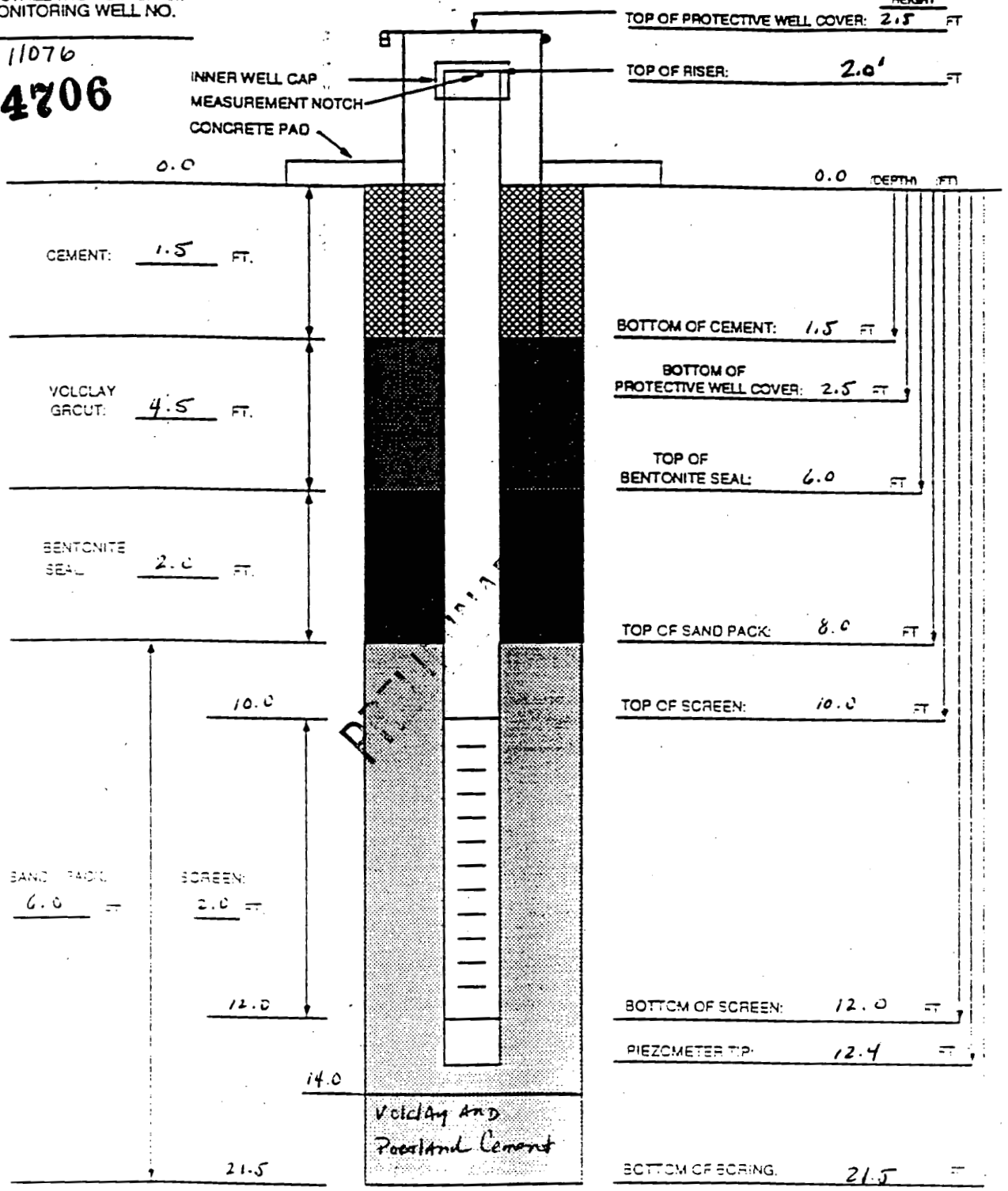
Background -
HT = 0.0 ppm
Bg = 40-60 cpm

2" split spoon driven by ASTM standards

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

11076
4706

INSTALLATION DATE: 7-7-93



HEIGHT
TOP OF PROTECTIVE WELL COVER: 2.5 FT
TOP OF RISER: 2.0' FT
0.0 (DEPTH) (FT)
BOTTOM OF CEMENT: 1.5 FT
BOTTOM OF PROTECTIVE WELL COVER: 2.5 FT
TOP OF BENTONITE SEAL: 6.0 FT
TOP OF SAND PACK: 8.0 FT
TOP OF SCREEN: 10.0 FT
BOTTOM OF SCREEN: 12.0 FT
PIEZOMETER TIP: 12.4 FT
BOTTOM OF BORING: 21.5 FT

BOREHOLE DIAMETER 10 IN

MATERIALS USED

SAND TYPE AND QUANTITY: #7 sand 7 Bags
BENTONITE PELLETS (6 GALLON BUCKETS): 1
VOLCLAY GROUT: 2 1/2 bags
AMOUNT OF CEMENT: 5 Pallets
AMOUNT OF WATER USED: 530 gallons
FILTER: Dennis - 2 sack 1 deponce
SO.CO.22

NOTES: See FMDC's for details of this monitoring completion

1) RISER PIPE IS 4 IN. O.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 IN. O.D. 316 STAINLESS STEEL PIPE WITH 010 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE ____
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESIS NOTE THE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH A LOCK

GEOLOGIST/ENGINEER C. Costello

FERNALD
RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU-5
PROJECT NO. 50.0322
BORING NO. 11076
PIEZOMETER NO. 11076

FIELD ENG./GEO. O. Costello DATE 7-7-93
CHECKED BY
DATE OF INSTALLATION 7-7-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM — TO —
FLUID NA FROM — TO —

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED:
SIZE 10 in. OD FROM 0.0 TO 21.5
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monitor Well
DIAMETER OF PERFORATED SECTION 4 in.
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS 0.01 in.
TOTAL PERFORATED AREA 2 ft.

RISER PIPE MATERIAL 316 STAINLESS STEEL
RISER PIPE DIAMETERS:
O.D. 4 3/8 in. I.D. 4 in
LENGTH OF PIPE SECTIONS One ten ft section
JOINING METHOD Flush joint threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5 ft
PROTECTIVE PIPE O.D. 10 3/4 in.

OTHER PROTECTION Hinged cover with padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION	
TOP OF RISER PIPE	+2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS: Cement	TOP 0.0	BOTTOM 1.5		
BENTONITE	TOP 1.5	BOTTOM 6.0	TOP	BOTTOM
SAND	TOP 6.0	BOTTOM 8.0	TOP	BOTTOM
GRAVEL	TOP 8.0	BOTTOM 14.0	TOP	BOTTOM
	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 8.0	BOTTOM 10.0	TOP	BOTTOM
PIEZOMETER TIP	12.4			
BOTTOM OF BOREHOLE	21.5			
WELL AFTER INSTALLATION				

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ___ X
WAS A PUMP TEST PERFORMED ON THE PIEZOMETER? YES ___ X

FERNALD RI/FS

4706

409195 VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 409197.030.13.000	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: 2881	COORDINATES: N/A	DATE: 7/2/93	
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED: 7/2/93	6/30/
ENGINEER/GEOLOGIST: T. Swann	Depth N/A Date/Time N/A	DATE COMPLETED:	
DRILLING METHODS: Cable Tool		PAGE 1 OF 24	

CAS/9/92

DEPTH (Ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 In)	RECOVERY (In)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0 – 58.0	N/A	N/A	N/A	drilled and drove casing from 0.0 to 58.0' where we took first sample	N/A	N/A	N/A
59.5	13:40 109797 7/2/93	80/6 0 0	6 0 0	very dense (10YR 5/4) yellowish brown sand and gravel, poorly graded, wet	SP	N/A	mT = 0.0 Bγ = 0.0
61.0	14:00 109798 7/2/93	38 50/4 0	6 6 0	very dense (10YR 5/4) yellowish brown, Dark brown seam at 59.9' (1/2" thick) poorly graded, moist,	SP	N/A	mT = 0.0 Bγ = 0.0
62.5	09:05 109799 7/7/93	35 50/3 0	6 0 0	very dense (10YR ~~4/4~~ 5/2) dark grayish brown, well graded medium grain sand and gravel, moist	GM	N/A	mT = 0.0 Bγ = 0.0
64.0	09:23 109800 7/7/93	20 30 42	6 6 0	very dense, (10YR ~~5/2~~ 4/4) dark yellowish brown medium grain sand and gravel, wet	GM	N/A	mT = 0.0 Bγ = 0.0
65.5	09:40 109801 7/7/93	13 36 44	6 6 0	very dense (10YR 5/2) grayish brown, well graded medium to coarse grained sand and gravel, wet	GM	N/A	mT = 0.0 Bγ = 0.0

NOTES: Will sample continuously from 58.0 – 73.0. Samples will be collected for sieve analysis and archive only.

N/A = not available
SAA = Same as Above
Drillers Criss Cutter, Roger Davis

mT = micro Tip
Bγ = Beta Gamma
cpm = counts per minute

Background mT = 0.0
Bγ = 0.0 – 80 cpm

RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 409195	PROJECT NAME: Fernald RI/FS		
BORING NUMBER: 2881	COORDINATES: N/A		
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE: 7/7/93	
ENGINEER/GEOLOGIST: T. Swann	Depth N/A Date/Time N/A	DATE STARTED: 6/30/93	
DRILLING METHODS: Cable Tool		DATE COMPLETED:	
		PAGE 2 OF 8	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	14:20	50/5	6	Very Dense, (10YR 6/2) Light brownish gray, ~~wet~~ poorly graded, medium to coarse grained sand and gravel, wet	GM	N/A	MT = 0.0
	109802	0	0				BZ = 0.0
67.0	7/7/93	0	0				
	14:40	22	6	Very Dense (10YR 6/2) Light brownish gray, medium to coarse sand and gravel, wet	GM	N/A	MT = 0.0
	109803	23	6				BZ = 0.0
68.5	7/7/93	47	6				
	15:00	36	6	very dense (10YR 5/3) brown, well graded, medium to coarse sand and gravel	GM	N/A	MT = 0.0
	109804	27	6				BZ = 0.0
70.0	7/7/93	40	0				
	07:20 (TS)	50/5	5	very dense (10YR 6/3) Pale brown, poorly graded, medium grained sand and gravel, wet	GM	N/A	MT = 0.0
	~~109805~~ 109805	0	0				BZ = 0.0
71.5	7/8/93	0	0				
	07:20 (TS)	12	6	Dense (10YR 6/3) Pale Brown, poorly graded, medium graind sand and gravel, wet	GM	N/A	MT = 0.0
	~~1098~~ 109806	16	6				BZ = 0.0
73.0	7/8/93	25	6				
				End of Hole = 73.0'			

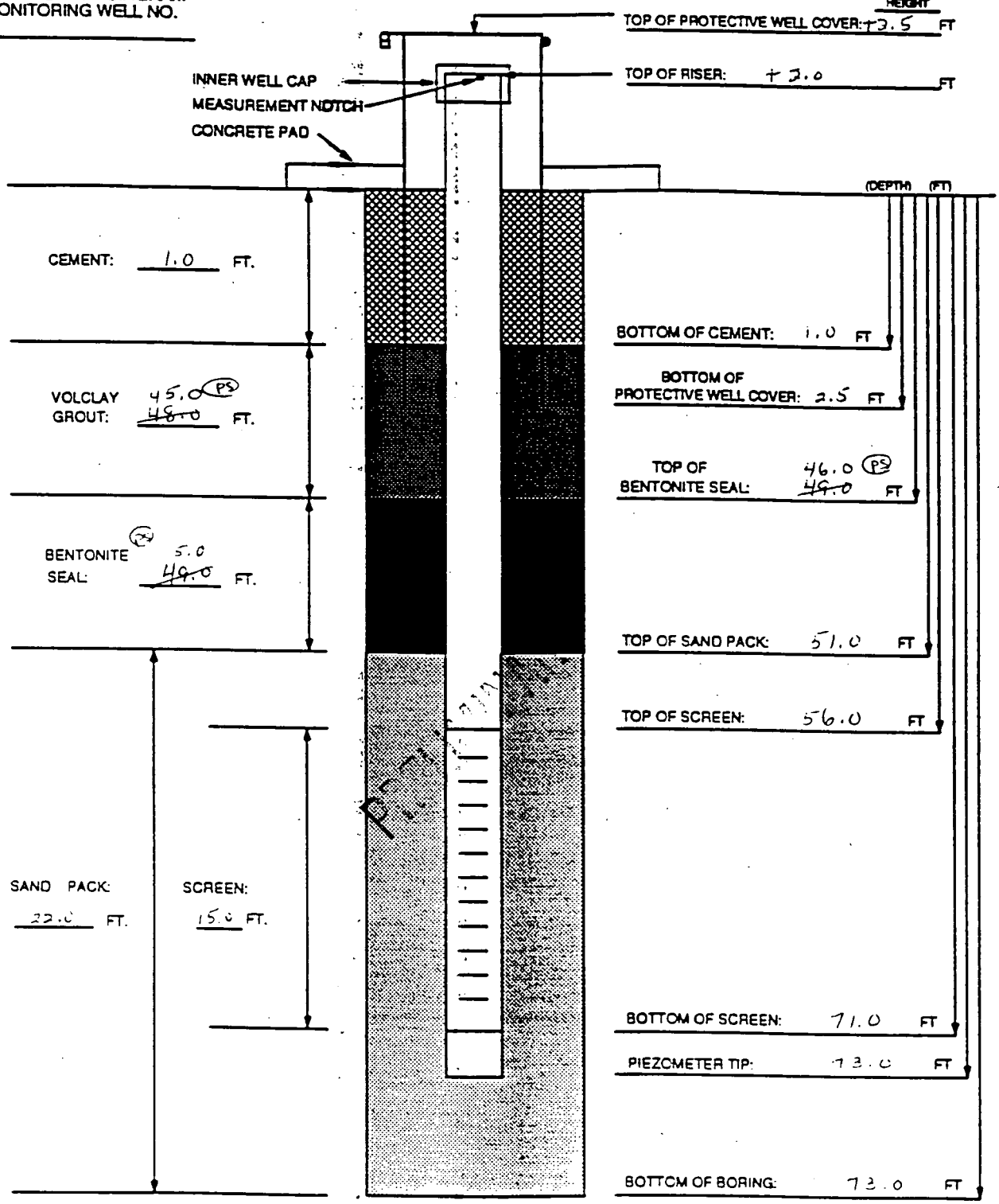
NOTES

Background MT = 0.0
BZ = 0.0

4706

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

INSTALLATION DATE: 7/13/93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED: SAND & Portland cement S.S.
BAG TYPE AND QUANTITY: 4/3c 25 bags
BENTONITE PELLETS (5-GALLON BUCKETS): 5 buckets
LBS OF VOLCLAY GROUT: 400 lbs.
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 12 gal
OTHER: N/A
TASK: N/A

NOTES:
1) RISER PIPE IS 4 1/2 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 1/2 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST/ENGINEER: [illegible]
4) WATER DEPTH AND DATE N/A FT/ N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

ASI FORM 0157 REV 01

MONITORING WELL ~~PIEZOMETER~~ INSTALLATION SHEET

PROJECT NAME OU-5 12-WELL
PROJECT NO. 04.33
BORING NO. 2881
PIEZOMETER NO. 2881

FIELD ENG./GEO. Smith / Swan DATE 7/13/93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 7/13/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool
DRILLING FLUID (S) USED:
FLUID water FROM 0.0 TO 60.0
FLUID N/A FROM N/A TO N/A

TYPE OF BIT hammer
CASING SIZE (S) USED:
SIZE 10 inch FROM 0.0 TO 73.0
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE #316 Stainless Steel
DIAMETER OF PERFORATED SECTION 4 inch
PERFORATION TYPE:
SLOTS ☑ HOLES ☐ SCREEN ☑
AVERAGE SIZE OF PERFORATIONS 0.020
TOTAL PERFORATED AREA 15.0

RISER PIPE MATERIAL stainless steel
RISER PIPE DIAMETERS:
O.D. 4 1/2 I.D. 4
LENGTH OF PIPE SECTIONS 10 feet
JOINING METHOD threaded flush

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 56.0
PROTECTIVE PIPE O.D. 10.0

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft.)		ELEVATION (N/A)	
TOP OF RISER PIPE	+2.0		N/A	
GROUND SURFACE	0.0		N/A	
BOTTOM OF PROTECTIVE PIPE	-2.5		N/A	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0	BOTTOM 46.0	TOP N/A	BOTTOM N/A
BENTONITE	TOP 46.0	BOTTOM 51.0	TOP N/A	BOTTOM N/A
SAND	TOP 56.0	BOTTOM 73.0	TOP N/A	BOTTOM N/A
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP	BOTTOM	TOP N/A	BOTTOM N/A
PIEZOMETER TIP	73.0		N/A	
BOTTOM OF BOREHOLE	73.0		↓	
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS None

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES	DATE 06-23-93	
ELEVATION:	GWL: Depth 70.82 Date/Time 07-28-93/0800	DATE STARTED 06-23-93	
ENGINEER/GEOLOGIST DAY	Depth Date/Time	DATE COMPLETED 07-13-93	
DRILLING METHODS CABLE TOOL		PAGE 1 OF 12	

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS BG BACKGROUND = 50 CPM MICROTIP (ppm)
0	109583 6-23 1025	10 9 6	0.9	MEDIUM DENSE BROWN CLAY. DRY (10YR 3/2) PP = 0.9	cl	0.9	MICROTIP = 0 BG = [redacted] 50 CPM
2.5	109584 6-23 1028	5 8 9	0.8	MEDIUM DENSE BROWN CLAY, SLIGHTLY MOIST. (10 YR 4/6) PP = 1.2	cl	1.2	MICROTIP = 0 BG = 50 CPM
	109585 6-23 1030	10 8 9	0.5	MEDIUM DENSE BROWN CLAY. SLIGHTLY MOIST. (10 YR 5/8) PP = 0.3	cl	0.3	MICROTIP = 0 BG = 50 CPM
5.0	109586 6-23 1035	7 10 11	1.5	MEDIUM DENSE BROWN CLAY. SLIGHTY MOIST. TRACE SAND AND GRAVEL. PP = 1.3 (10YR 4/4)	cl	1.3	MICROTIP = 0 BG = 80 CPM
7.5	109587 6-23 1038	11 20 15	1.5	MEDIUM DENSE BROWN CLAY. SLIGHTLY MOIST. TRACE SAND AND GRAVEL. PP = 1.9 (10 YR 5/6)	cl	1.9	MICROTIP = 0 BG = 50 CPM
	109588 6-23 1045	15 25 17	1.0	DENSE BROWN SANDY CLAY. MOIST PP = 3.75 (10 YR 4/4)	cl	3.75	MICROTIP = 0 BG = 30 CPM
10.0	109589 6-23 1050	21 27 25	0.8	VERY DENSE SANDY AND GRAVELLY BROWN CLAY. WET. PP = 1.5 (10 YR 4/6)	cl	1.5	MICROTIP = 0 BG = 50 CPM
	109590 6-23 1420	13 23 35	1.5	VERY DENSE SANDY AND GRAVELLY GRAY AND BROWN MOTTLED CLAY. ~~WET.~~ MOIST PP = 2.6 (10 YR 5/1) AND (10YR 5/6)	cl	2.6	MICROTIP = 0 BG = 50 CPM
12.5	109591 6-23 1426	8 12 19	1.5	DENSE SANDY AND GRAVELLY DARK GRAY CLAY. MOIST. PP = 2.2 (10 YR 4/1)	cl	2.2	MICROTIP = 0 BG = 60 CPM
	109592 6-23 1440	7 10 15	0.3	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. MOIST. PP = 2.2 (10 YR 4/1)	cl	2.2	MICROTIP = 0 BG = 70 CPM

15.0

NOTES

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES	DATE 06-23-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 06-23-93	
ENGINEER/GEOLOGIST DAY	Depth Date/Time	DATE COMPLETED 07-13-93	
DRILLING METHODS CABLE TOOL		PAGE 2 OF 12	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	REMARKS β γ (CPM)
5.0	109695 6-23 1450	7 11 19	1.0	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. MOIST. PP = 3.2 (10YR 4/1)	cl	3.2	0	60 CPM
17.5	109696 6-24 0830	7 8 16	0.5	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. MOIST. P.P. = 3.2 (10YR 4/1)	cl	3.2	0	20
	109697 6-24 0840	4 4 13	0.2	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. MOIST. P.P. NOT AVAILABLE (10YR 4/1)	cl	—	0	20
20.0	109698 6-24 0850	4 8 16	1.0	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. MOIST. P.P. = 1.4 (10YR 4/1)	cl	1.4	0	20
	109699 6-24 0855	4 12 14	1.5	MEDIUM DENSE SANDY DARK GRAY CLAY. MOIST. (10YR 4/1) PP = 1.9	cl	1.9	0	10
22.5	109700 6-24 0900	7 7 10	0.8	MEDIUM DENSE SANDY DARK GRAY CLAY. MOIST. (10YR 4/1) PP = 1.8	cl	1.8	0	10
	109701 6-24 0950	3 4 9	0.1	MEDIUM DENSE SANDY DARK GRAY CLAY. MOIST. (10YR 4/1) PP = NOT AVAILABLE.	cl	—	0	20
25.0	109702 6-24 1005	9 8 11	0.2	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. VERY MOIST TO WET. PP = 0.6 (10YR 4/1)	cl	0.6	0	10
27.5	109703 6-24 1015	8 7 10	0.5	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. WET. (10YR 4/1) PP = 0.6	cl	0.6	0	10
	109704 6-24 1020	8 5 12	0.9	MEDIUM DENSE SANDY AND GRAVELLY DARK GRAY CLAY. WET. (10YR 4/1) PP = 0.8	cl	0.8	0	10
0.0	NOTES							

BACKGROUND FOR β γ METER = 0 OR BELOW 0

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES		DATE 06-24-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST DAY	Depth	Date/Time	DATE COMPLETED 07-13-93
DRILLING METHODS CABLE TOOL			PAGE 3 OF 12

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	REMARKS BX (CPM)
30	109705 6-24 1040	20 40 43	1.5	VERY DENSE SANDY AND GRAVELLY DARK GRAY CLAY (10YR 4/1) WET.	cl	—	0	10
				31.0-31.5 - DENSE BROWN MEDIUM SAND. LOOSE. DRY. (10YR 6/6)	SW			
32.5								
35	109706 6-24 1105	25 45 25	1.0	VERY DENSE MEDIUM BROWN SAND WITH GRAVEL. (10 YR 6/6)	SP	—	0	10
37.5								
40	109707 6-24 1410	30 50 50	1.3	VERY DENSE MEDIUM AND COARSE BROWN SAND WITH GRAVEL. MOIST. (10YR 5/6)	SP	—	0	10
42.5								
45	NOTES							

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES	DATE 06-24-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 06-23-93	
ENGINEER/GEOLOGIST DAY	Depth Date/Time	DATE COMPLETED 07-13-93	
DRILLING METHODS CABLE TOOL		PAGE 4 OF 12	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (FT)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	REMARKS BH (CPM)
45	109708 6-24 1630	25 50/1.0'	0.5	VERY DENSE COARSE SAND AND GRAVEL. BROWN (YR 10 5/4). DRY. LOOSE	SP	—	0	10
47.5								
50	109709 6-24 1700	28 42 38	0.6	VERY DENSE BROWN MEDIUM WELL SORTED SAND. (YR 10 5/3). DRY. LOOSE.	SP	—	0	10
52.5								
55	109710 6-25 1345	50/0.4	0.2	VERY DENSE MEDIUM AND COARSE BROWN SAND. LOOSE. DRY. (10YR 4/3)	SP	—	0	10
57.5								
60								

NOTES

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES		DATE 06-25-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST DAY	Depth	Date/Time	DATE COMPLETED 07-13-93
DRILLING METHODS CABLE TOOL			PAGE 5 OF 12

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	REMARKS BZ (CPM)
0	109711 6-25 1400	17 48 25	1.2	VERY DENSE MEDIUM BROWN SAND WITH GRAVEL. LOOSE. DRY. (10YR 4/4)	SP	—	0	10
62.5								
65	109712 6-25 1520	4 10 18	0.1	MEDIUM DENSE COARSE BROWN SAND WITH GRAVEL. LOOSE. DRY. (10YR 5/4).	SP	—	0	10
67.5								
70	109713 6-25 1540	10 19 21	1.3	DENSE MEDIUM AND COARSE BROWN SAND WITH GRAVEL. LOOSE. WET. (10YR 4/2)	SP	—	0	10
72.5								
75								

NOTES

WATER LEVEL ≈ 68.0 FT

VISUAL CLASSIFICATION OF SOILS

4206

PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES	DATE 06-25-93	
ELEVATION	GWL: Depth HYDROPUNCH 71.50 Date/Time 6-29-93/1240	DATE STARTED 06-23-93	
ENGINEER/GEOLOGIST DAY	Depth Date/Time	DATE COMPLETED 07-13-93	
DRILLING METHODS CABLE TOOL		PAGE 6 OF 12	

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	REMARKS BY (CPM)
75	109714 6-28 0945	4 10 16	0.6	MEDIUM DENSE COARSE BROWN SAND AND GRAVEL. LOOSE. WET. (10YR 4/3)	SP	—	0	0
77.5								
80	109715 6-29 0810	13 13 11	0.7	MEDIUM DENSE COARSE GRAY SAND AND GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
82.5								
85	109716 6-29 0940	25 25 50	1.4	VERY DENSE MEDIUM TO COARSE GRAY SAND. LOOSE. WET. (10YR 5/1).	SP	—	0	0
87.5								
90								

NOTES

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER 409197	PROJECT NAME FERNALD	
BORING NUMBER 3899	COORDINATES:	DATE 06-30-93
ELEVATION:	GWL: Depth : Date/Time	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST DAY	Depth : Date/Time	DATE COMPLETED 07-13-93
DRILLING METHODS CABLE TOOL		PAGE 7 OF 12

DEPTH - FT -	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER - 6" -	RECOVERY - FT. -	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	BY
90	109721 6-30 1040	7 7 12	0.6	MEDIUM DENSE MEDIUM AND COARSE GRAY SAND. LOOSE. WET. (10YR 4/1)	SP	—	0	0
92.5								
95	109722 6-30 1440	17 21 30	1.0	VERY DENSE COARSE GRAY SAND WITH GRAVEL. LOOSE. ~~WET~~. (10YR 4/1)	SP	—	0	0
97.5	109725 7-01 1450	23 33 45	1.3	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
	109726 7-01 1510	6 7 11	0.5	MEDIUM DENSE COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
100	109727 7-02 0730	35 100 135	1.3	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
	109728 7-02 0820	40 45 40	0.5	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
102.5	109729 7-02 0900	30 82 24	1.5	VERY DENSE COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
	109730 7-02 1050	57 43 57	1.5	VERY DENSE MEDIUM AND COARSE GRAY SAND. LOOSE. WET. (10YR 4/1)	SP	—	0	0

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 409197	PROJECT NAME: FERNALD		
BORING NUMBER 3899	COORDINATES:		DATE 07-02-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST DAY	Depth	Date/Time	DATE COMPLETED 07-13-93
DRILLING METHODS CABLE TOOL			PAGE 8 OF 12

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT.	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (PPM)	REMARKS BX (CPM)
05								
	109731 7-02 1310	29 37 54	1.5	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1)	SP	—	0	0
107.5	109732 7-07 1425	65 85 90	1.4	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1)	SP	—	0	0
	109733 7-07 1450	35 75 90	1.5	VERY DENSE COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1)	SP	—	0	0
110	109734 7-08 0635	35 65 100	1.5	VERY DENSE COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1).	SP	—	0	0
112.5	109735 7-08 0705	20 35 57	1.5	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1).	SP	—	0	0
	109736 7-08 0750	65 82 67	1.5	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1)	SP	—	0	0
115	109737 7-08 0840	20 27 34	1.3	VERY DENSE FINE AND MEDIUM GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1)	SP	—	0	0
	109738 7-08 1030	10 24 27	1.3	VERY DENSE FINE AND MEDIUM GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1).	SP	—	0	0
117.5	109739 7-08 1310	43 54 59	0.7	VERY DENSE MEDIUM AND COARSE ARGILLACEOUS GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 4/1)	GC	—	0	0
	109740 7-9	65 92	1.2	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE.	SP	—	0	0
120	WITS 1040	86		WET. (10 YR 4/1)				
20.5								

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409105	PROJECT NAME Fernald RI/FS		
BORING NUMBER 3899	COORDINATES N/A	DATE 7/10/93	
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED 06-23-93	
ENGINEER/GEOLOGIST Swann	Depth N/A Date/Time N/A	DATE COMPLETED 07-13-93	
DRILLING METHODS Cable Tool		PAGE 9 OF 12	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY	REMARKS
120.5	08:10	30	6	very dense (10YR, 6/1) gray, medium to coarse grain sand and gravel, 3" medium grain sand seam at 121.7, wet	GP	N/A	BZ = 0.0 MT = 0.0
	109741	34	6				
122.0	7/10/93	30	6				
	08:45	20	6	very dense (10YR, 5/1) gray, fine to medium grain sand with some gravel, wet	TS ~~SW~~ SP	N/A	BZ = 0.0 MT = 0.0
	109742	24	6				
123.5	7/10/93	28	0				
	9:40	12	0	very dense	N/A	N/A	N/A
	109743	22	0	no Recovery			N/A
125.0	7/10/93	30	0				
	10:40	20	~~20~~ 6	very dense (10YR, 4/1) dark grey, medium grain sand with some gravel, moist	SP	N/A	BZ = 0.0 MT = 0.0
	109744	20	~~20~~ 6				
126.5	7/10/93	47	~~47~~ 6				
	11:45	7	6	medium dense (10YR, 5/1) gray, medium to coarse sand and gravel, wet	SP	N/A	BZ = 0.0 MT = 0.0
	109745	10	6				
128.0	7/10/93	19	0				
	08:30	38	6	Dense (10YR 5/1) gray, medium to coarse grain sand and gravel, ~~wet~~ moist.	SP	N/A	BZ ~~= 0.0~~ 80 cpm MT ~~= 0.0~~ 8 ppm
	109746	42	6				
129.5	7/11/93	7	6				

NOTES Swann substituting for Day
Drillers - Jeff Checkian (Driller)
Doug Nelson (Helper)
PA Drilling

Background (7/10/93)
Beta Gamma (BZ) = 0.0
Micro Tip (MT) = 0.0
N/A = not applicable

4700

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 409195	PROJECT NAME Fernald	
BORING NUMBER 3899	COORDINATES NA	DATE 7/11/93
ELEVATION: N/A	GWL: Depth NA Date/Time NA	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST SWANN	Depth NA Date/Time NA	DATE COMPLETED: 07-13-93
DRILLING METHODS Cable tool		PAGE 10 OF 12

DEPTH (Feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY USCS	REMARKS
129.5	09:00	17	6	Very dense (10YR 5/1) gray, medium to coarse grain sand and gravel. wet	SP	NA	BG = 0.0
	109747	22	6				MT = 0.0
131.0	7/11/93	35	0				
	0930	17	6	Very dense (10YR 4/1) dark grey sample grades from medium to coarse grain sand and gravel, wet	SP	NA	BG = 0.0
	109748	30	6				MT = 0.0
132.5	7/11/93	65	6				
	10:00	4	6	very dense (10YR 6/1) gray, medium to coarse sand and gravel, wet	SP	NA	BG = 0.0
	109749	16	6				MT = 0.0
134.0	7/11/93	40	0				
	11:05	18	6	Very Dense (10YR 6/1) gray, medium to coarse sand and gravel, wet	SP	NA	BG = 0.0
	109750	23	6				MT = 0.0
135.5	7/11/93	27	6				
	12:00	22	6	Very Dense (10YR 6/1) gray, medium to coarse sand and gravel, wet	SP	NA	BG = 0.0
	109751	39	6				MT = 0.0
137.0	7/11/93	44	6				
	109752	24		VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10 YR 5/1).	SP	—	BG = 0
	7-12	42	0.8				MT = 0
138.5	0815	36					

NOTES Swann substituting for P. Day

Drillers - Jeff Checkan
Doug Nelson

Penn Drilling

Background
Beta Gamma (BG) = 0.0
Micro Tip (MT) = 0.0

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER 409197	PROJECT NAME FERNALD	
BORING NUMBER 3899	COORDINATES	DATE 07-12-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST DAY	Depth Date/Time	DATE COMPLETED 07-13-93
DRILLING METHODS CABLE TOOL		PAGE 11 OF 12

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MILLIOTIP (ppm)	β γ
7.5								
	109753 7-12 0835	10 12 14	0.7	MEDIUM DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1).	SP	—	0	0
140	109754 7-12 1345	10 12 44	0.1	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1).	SP	—	0	0
142.5	109755 7-13 0650	40 100 120	1.5	VERY DENSE COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1).	SP	—	0	0
	109756 7-13 0720	100 120/0.7	0.7	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. ARGILLACEOUS. (10YR 4/1)	SP	—	0	0
145	109757 7-13 0825	44 69 75	1.5	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE WET. SLIGHTY ARGILLACEOUS. (10YR 4/1)	SP	—	0	0
	109759 7-13 0845	70 50/0.7	0.7	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
147.5	109760 7-13 0955	25 80/0.8	0.1	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
150	109761 7-13 1015	56 50/0.8	0.8	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1)	SP	—	0	0
	109762 7-13 1315	65 50/0.8	0.8	VERY DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE WET (10YR 4/1).	SP	—	0	0
5								

NOTES

SIEVE ANALYSIS SAMPLE # = 109758

145.0 ~ 155.0 FT. NO SAMPLE 147.5 ~ 149.0 FT DUE TO LACK OF RECOVERY.

RI/FS

VISUAL CLASSIFICATION OF SOILS

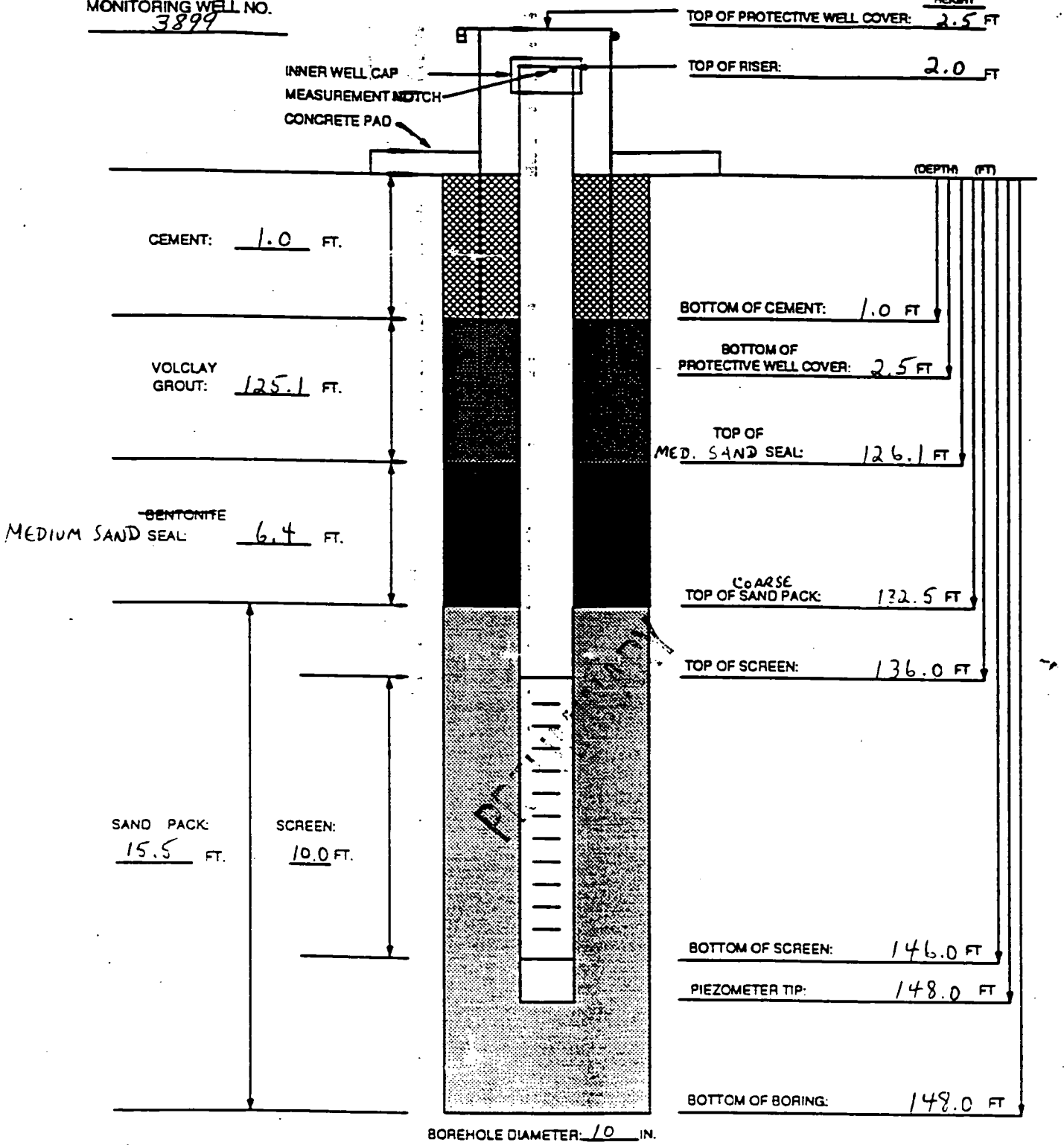
PROJECT NUMBER 409197	PROJECT NAME FERNALD		
BORING NUMBER 3899	COORDINATES		DATE 07-13-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 06-23-93
ENGINEER/GEOLOGIST DAY	Depth	Date/Time	DATE COMPLETED 07-13-93
DRILLING METHODS CABLE TOOL			PAGE 12 OF 12

DEPTH FT	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY FT	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS MICROTIP (ppm)	REMARKS BZ
50								
152.5	109763 7-13 1415	10 12 14	0.8	MEDIUM DENSE MEDIUM AND COARSE GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1).	SP	—	0	0
155	109764 7-13 1505	4 12 25	0.7	DENSE MEDIUM GRAY SAND WITH GRAVEL. LOOSE. WET. (10YR 4/1).	SP	—	0	0

NOTES

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 3899

INSTALLATION DATE: 07-28-93



BOREHOLE DIAMETER: 10 IN.

MATERIALS USED: GLOBAL 4/30 SAND - 19 BAGS

SAND TYPE AND QUANTITY: GLOBAL 10/40 SAND - 6 BAGS
BENTONITE PELLETS (5-GALLON BUCKETS): NONE
BAGS OF VOLCLAY GROUT: 45
AMOUNT OF CEMENT: ½ BAG
AMOUNT OF WATER USED: 1200 GAL
OTHER:
TASK:

NOTES:

1) RISER PIPE IS 4 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.020 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 70.82 FT/ 07-28-93
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: PAUL R. DAY

ASI FORM 0157 REV. (01)

PIEZOMETER INSTALLATION SHEET

4706

PROJECT NAME FERNALD FIELD ENG./GEO. DAY DATE 07-30-93
PROJECT NO. 409197 CHECKED BY DATE
BORING NO. 3899
PIEZOMETER NO. 3899 DATE OF INSTALLATION 07-28-93

BOREHOLE DRILLING

DRILLING METHOD CABLE TOOL	TYPE OF BIT
DRILLING FLUID (S) USED: NONE	CASING SIZE (S) USED:
FLUID FROM TO	SIZE 10" ID FROM 0 TO 155.0'
FLUID FROM TO	SIZE FROM TO

PIEZOMETER DESCRIPTION

TYPE STAINLESS STEEL	RISER PIPE MATERIAL STAINLESS STEEL
DIAMETER OF PERFORATED SECTION 4"	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. I.D. 4"
SLOTS ☐ HOLES ☐ SCREEN ☒	LENGTH OF PIPE SECTIONS 10'
AVERAGE SIZE OF PERFORATIONS 0.020	JOINING METHOD THREADED SECTIONS
TOTAL PERFORATED AREA 136-146'	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0'	OTHER PROTECTION
PROTECTIVE PIPE O.D. 12"	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	2.0		NOT SURVEYED	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 126.1	TOP	BOTTOM
BENTONITE - NONE	TOP	BOTTOM	TOP	BOTTOM
SAND - MEDIUM	TOP 126.1	BOTTOM 132.5	TOP	BOTTOM
~~GRAVEL~~ SAND - COARSE	TOP 132.5	BOTTOM 148.0	TOP	BOTTOM
PERFORATED SECTION	TOP 136.0	BOTTOM 146.0	TOP	BOTTOM
PIEZOMETER TIP	148.0			
BOTTOM OF BOREHOLE	148.0			
GWL AFTER INSTALLATION	70.82			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS

VISUAL CLASSIFICATION OF SOILS — 4706

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU5	
BORING NUMBER. B 811086	COORDINATES:	DATE 7-26-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-26-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-26-93
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 34

DEPTH IN FT 0.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY IN	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (OPC-7-26)
0.5	0802 122651 122652 122653	13	6	HARD (10YR, 2/1) VERY DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY. Roots.	CL	4+	MT = 0.0 ppm; Bg = 10 cpm
1.0	0802	9	6	SAA	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122654-A
1.5	0802 122655 122656 122657	16	6	SAA; Spoon 1 ↑	CL	4+	MT = 0.0 ppm; Bg = 10 cpm
2.0	0805	21	6	HARD (10YR, 5/3) BROWN, SILTY CLAY, LOW PLASTICITY, DRY.	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122658-A
2.5	0805	26	6	SAA	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122659-A
3.0	0805 122660 122661 122662	31	6	SAA; Spoon 1 ↑	CL	4+	MT = 0.0 ppm; Bg = 10 cpm
3.5	0827	23	6	HARD (10YR, 5/6) YELLOWISH BROWN, SILTY CLAY, MOTTLED, low plasticity, DRY	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122663-A
4.0	0827	23	6	SAA	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122664-A
4.5	0827	21	6	SAA; Spoon 3 ↑	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122665
5.0	0846	11	6	SAA	CL	4+	MT = 0.0 ppm; Bg = 10 cpm; 122666

NOTES

SAA - Same as Above

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - R. Davis

Rig Mob. 80

Background

MT = 0.0 ppm

Bg = 10 cpm

LOG OF BORINGS OR SOILS

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. CEU5		
BORING NUMBER 086	COORDINATES:		DATE 7-26-93
ELEVATION: 4706	GWL: Depth	Date/Time	DATE STARTED 7-26-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-26-93
DRILLING METHODS: Hollow Stem Auger			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							07-26-93
5.5	0846	6	6	SAA	CL	4+	MT = 0.0 ppm Bg = 10 cpm 122667-A
6.0	0846	7	6	SOFT (10YR,5/6) YELLOWISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY Spoon 4 ↑	CL	.5	MT = 0.0 ppm Bg = 10 cpm 122668-A
6.5	0850 122669 122670 122671	10	6	SAA	CL	.5	MT = 0.0 ppm Bg = 10 cpm
7.0	0850	16	6	SAA	CL	.5	MT = 0.0 ppm Bg = 10 cpm 122672
7.5	0850	16	6	VERY STIFF (10YR,5/6) YELLOWISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY. Spoon 5 ↑	CL	3.0	MT = 0.0 ppm Bg = 10 cpm 122673
8.0	0902	2	6	VERY STIFF (10YR,5/6) yellowish Brown, silty clay, with small gravel pebbles, medium plasticity, DRY	CL	3.0	MT = 0.0 ppm Bg = 10 cpm 122674
8.5	0902	8	6	SAA	CL	3.0	MT = 0.0 ppm Bg = 10 cpm 122675
9.0	0902	13	6	SAA Spoon 6 ↑	CL	3.0	MT = 0.0 ppm Bg = 10 cpm 122676
9.5	0909 122677 122678 122679	7	6	SOFT (10YR,5/8) yellowish brown silty clay, almost a silt, no gravel pebbles, medium plasticity, Dry	CL	.5	MT = 0.0 ppm Bg = 10 cpm
10.0	0909	8	6	VERY STIFF (10YR,3/6) yellowish brown, silty clay with gravel pebbles, medium plasticity, Dry	CL	5.0	MT = 0.0 ppm Bg = 10 cpm 122680

SAA - Same As Above

Driller - Resin Drill
Contractor
Driver - M. Bentley
Helper - R. Davis
Mobile 80

Background
MT - 0.0 ppm
Bg - 10 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	4706
BORING NUMBER. 11086	COORDINATES.	DATE 7-26-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-26-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-26-93
DRILLING METHODS Hollow Stem Auger		PAGE 3 OF 34

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							07-264
10.5	0904	11	6	Very stiff (10YR 3/6) yellowish brown, silty clay with gravel pebbles, medium plasticity, dry Spoon 7	CL	3.0	MT = 0.0 ppm; BG = 10 cpm; 122681
11.0	0919	13	6	SAA Spoon	CL	3.0	MT = 0.0 ppm; BG = 10 cpm; 122682
11.5	0919	16	6	SAA Note change in color	CL	3.0	MT = 0.0 ppm; BG = 10 cpm; 122683
12.0	0919	21	6	Very stiff (10YR 5/1) gray, sicky clay, medium to high plasticity, dry, gravel pebbles. Spoon 8	CL	2.0	MT = 0.0 ppm; BG = 10 cpm; 122684
12.5	0925 122685 122686 122687	7	6	SAA - moist	CL	2.0	MT = 0.0 ppm; BG = 10 cpm
13.0	0925	8	6	SAA - moist	CL	2.0	MT = 0.0 ppm; BG = 10 cpm; 122688
13.5	0925	14	6	SAA - moist Spoon 9	CL	2.0	MT = 0.0 ppm; BG = 10 cpm; 122689
14.0	1003	16	6	Dense (10YR 5/1) gray, clayey silt, moist	ML	NA	MT = 0.0 ppm; BG = 10 cpm; 122690
14.5	1003	23	6	SAA	ML	NA	MT = 0.0 ppm; BG = cpm; 122691
15.0	1003	18	6	Dense (10YR 5/1) gray, silt with fine to medium grained sand, poorly graded, moist. Spoon 10	ML	NA	MT = 0.0 ppm; BG = 10 cpm; 122692

SAA - Same As Above

Driller - Resin Drill Contractor

Driller - M. Bentley

Helper - R. Davis

Rig Mobile 80

Background MT - 0.0 ppm; BG - 10 cpm

706

LOG OF BORING AND CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11086	COORDINATES:	DATE 7-26-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-26-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-26-93
DRILLING METHODS: Hollow Stem Auger		PAGE 4 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.0							
15.5	1015 122693 122694 122695	20	6.	Dense (10YR 5/1) GRAY, SILT. WET	ML	NA	MT = 0.0 ppm Bg = 10 cpm
16.0	1015	13	6	SAA	ML	NA	MT = 0.0 ppm Bg = 10 cpm 122696
16.5	1015	21	6	SAA Total Depth 16.5 m	ML	NA	MT = 0.0 ppm Bg = 10 cpm 122697
				122698-Trip Blank			MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES:

Driller - Rexin Drill
Contractor

Driller - M. Bentley
Helper - R. Davis

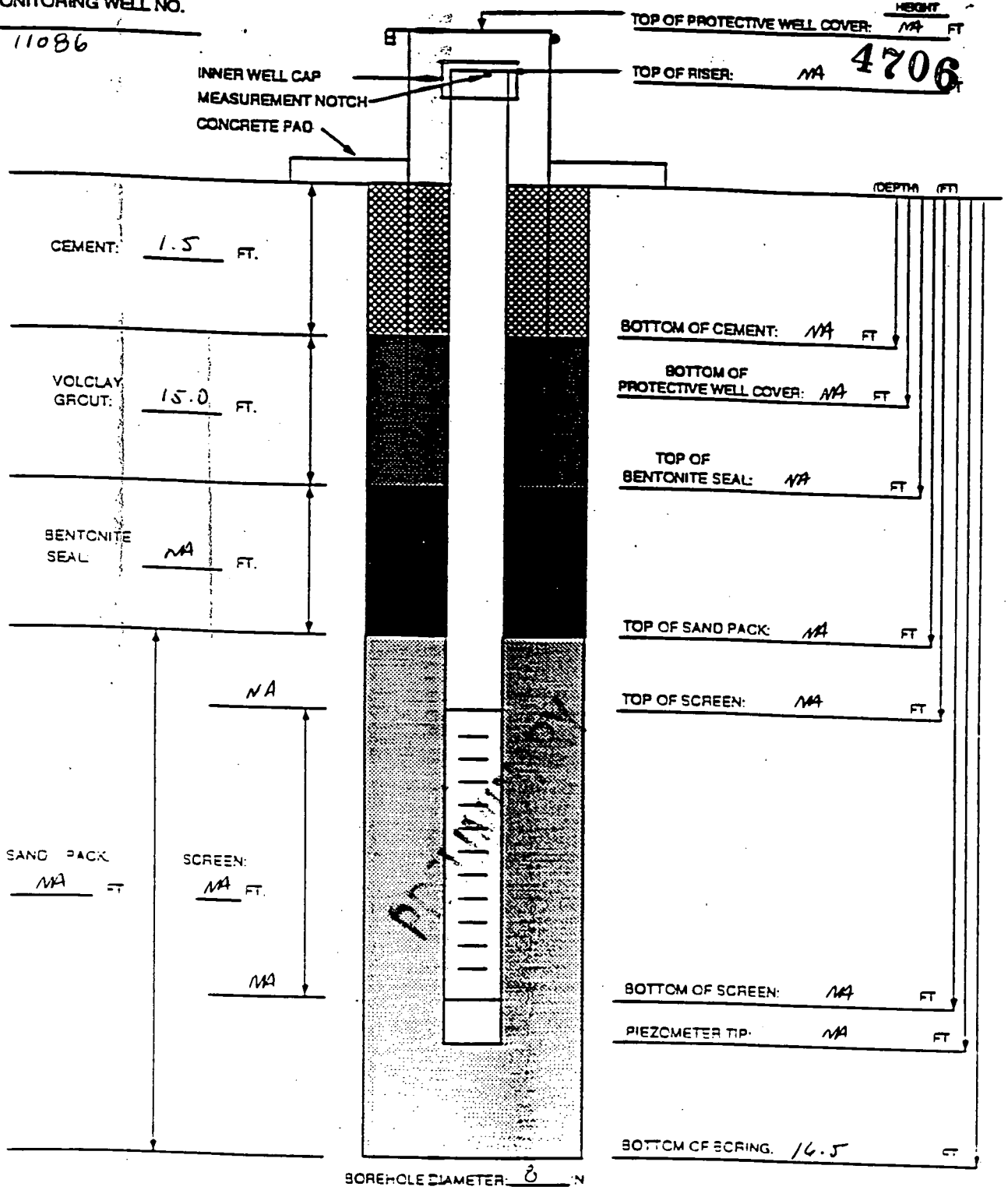
Rig Mobile 80

SAA - Same As Above

Background
MT - 0.0 ppm
Bg = 10.0 cpm

FERNALD RMPS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11086

INSTALLATION DATE: 07-26-93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5 GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 20 Gallons
OTHER: NA
TASK: NA

NOTES

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0 NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA — NA
5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A BEEPER COVER WITH PADLOCK

GEOLOGIST/ENGINEER: J. Costello

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU-5
PROJECT NO. 5a.03.18
BORING NO. 11086
PIEZOMETER NO. 11086

FIELD ENG./GEO. O. Costello
CHECKED BY _____ DATE 7-26-
DATE _____
DATE OF INSTALLATION 7-26-93.

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID _____ FROM NA TO _____
FLUID _____ FROM _____ TO _____

TYPE OF BIT _____
CASING SIZE (S) USED:
SIZE NA FROM _____ TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE _____
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE:
SLOTS ☐ NA HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL _____
RISER PIPE DIAMETERS:
O.D. NA I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0	BOTTOM 1.5		
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	TOP NA	BOTTOM NA	TOP	BOTTOM
BOTTOM OF BOREHOLE	NA			
SWL AFTER INSTALLATION	16.5			
	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NA ☒ NO ☐
REMARKS NA

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11090	COORDINATES:	DATE 07-28-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 07-28-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 07-29-
DRILLING METHODS: Hollow Stem Auger - 3 inch split spoon, 140 lb hammer.		PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	1312 122699 122700 122701	3	6	Hard (10YR, 4/3) Brown, silty clay, low plasticity, dry.	CL	4+	HNT = 0.0 ppm Bg = 130 cpm
1.0	1312	4	6	SAA	CL	4+	HNT = 0.0 ppm Bg = 130 cpm 122702-A
1.5	1312 122703 122704 122705	13	6	SAA Spoon 1	CL	4+	HNT = 0.0 ppm Bg = 130 cpm
2.0	1330	12	6	Hard (10YR, 3/1) Very dark gray, silty clay, low plasticity, dry	CL	4+	HNT = 0.0 ppm Bg = 130 cpm 122706-A
2.5	1330	16	6	SAA	CL	4+	HNT = 0.0 ppm Bg = 130 cpm 122707-A
3.0	1338 122708 122709 122710	21	6	SAA Spoon 2	CL	4+	HNT = 0.0 ppm Bg = 130 cpm
3.5	1345	29	6	Hard (10YR, 4/6) Dark yellowish brown, silty clay, low plasticity, dry	CL	4+	HNT = 0.0 ppm Bg = 130 cpm 122711-A
4.0	1345	31	6	SAA	CL	4+	HNT = 0.0 ppm Bg = 130 cpm 122712-A
4.5	1345	26	6	SAA Spoon 3	CL	4+	HNT = 0.0 ppm Bg = 130 cpm 122713-A
5.0	1505	8	6	Very stiff (10YR, 4/1) Dark gray, silty clay, low plasticity, dry	CL	3.5	HNT = 0.0 ppm Bg = 130 cpm 122714-A

NOTES

SAA - Same As Above

Driller - Rexon Drill Contractor

Driller - M. Bentley, C. Cowler

Helper - B.H. Anderson, Roger Davis

Background
HNT - 0.0 ppm
Bg = 130 cpm

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5
BORING NUMBER. 11090	COORDINATES.
ELEVATION:	GWL: Depth Date/Time
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time
DRILLING METHODS: Hollow Stem Auger - see p.1	

DATE 07-28-93
DATE STARTED: 07-28-93
DATE COMPLETED: 07-29-93
PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
5.5	1505	12	6	VERY STIFF (10YR, 4/1) DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY.	CL	3.5	MT = 0.0 ppm BG = 130 cpm 122715-A
6.0	1505	12	6	SAA CRC-1-28-93 Sample 4	CL	3.5	MT = 0.0 ppm BG = 130 cpm 122716-A
6.5	1509 122717 122718 122719	17	6	~~SAA~~ HARD (10YR, 4/1). DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY.	CL	4+	MT = 0.0 ppm BG = 130 cpm
7.0	1509	21	6	SAA	CL	4+	MT = 0.0 ppm BG = 130 cpm 122720-A
7.5	1509	26	6	SAA Sample 5	CL	4+	MT = 0.0 ppm BG = 130 cpm 122721-A
8.0	1512	13	6	SAA	CL	4+	MT = 0.0 ppm BG = 130 cpm 122722-A
8.5	1512	24	6	SAA	CL	4+	MT = 0.0 ppm BG = 130 cpm 122723-A
9.0	1512	31	6	SAA Sample 6	CL	4+	MT = 0.0 ppm BG = 130 cpm 122724-A
9.5	1529 122725 122726 122727	20	6	SAA	CL	4+	MT = 0.0 ppm BG = 130 cpm
10.0	1529	3	6	SAA	CL	4+	MT = 0.0 ppm BG = 130 cpm 122728-A

NOTES

Driller - Rexon Drill Contractor

Driller - see p.1

Helper -

SAA - Same As Above

Background
MT - 0.0 ppm
BG = 130 cpm

LIO

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11090	COORDINATES.	DATE 07-28-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 07-28-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 07-29-93
DRILLING METHODS Hollow Stem Auger see p.1		PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1'	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							
10.5	1529	7	6	VERY STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. Sloan 7 ↑	CL	3.0	MT = 0.0 ppm Bg = 130 cpm 122729-A
11.0	1534	12	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122730-A
11.5	1534	19	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122731-A
12.0	1534	26	6	SAA Sloan 8 ↑	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122732-A
12.5	0730 122733 122734 122735	13	6	VERY STIFF (10YR 4/1) DARK GRAY, SILTY CLAY, MEDIUM PLASTICITY, DRY. SMALL BIRDSEAT SIZE GRAVEL COMMON, SOME LARGER COBBLES.	CL	2.5	MT = 0.0 ppm Bg = 130 cpm
13.0	0730	15	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122736-A
13.5	0730	19	6	SAA Sloan 9 ↑	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122737-A
14.0	0745	5	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122738-A
14.5	0745	6	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122739-A
15.0	0745	9	6	SAA Sloan 10 ↑	CL	2.5	MT = 0.0 ppm Bg = 130 cpm 122740-A

NOTES

Driller - Penn Drill Contractor

Driller -

Helper -

SAA - Same As Above

Background MT - 0.0 ppm Bg - 130 cpm

...CLASSIFICATION OF SOILS

PROJECT NUMBER: CRU-5 50.03.18	PROJECT NAME: CRU-5	
BORING NUMBER: 11090 (4706)	COORDINATES:	DATE 07-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 07-28-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 07-29-93
DRILLING METHODS: Hollow Stem Auger See P.1		PAGE 4 OF 5

DEPTH (FT) 15.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
							SUSTAINED HLTIP at 3.0
15.5	0737 122741 122742 122743	5	6	VERY STIFF (10YR, 4/1) DARK GRAY SILTY CLAY, MEDIUM TO HIGH PLASTICITY, MOIST. Some SMALL GRAVEL throughout. Occasional larger cobbles. Also some woody material.	CL	2.5	HLT = ~~3.0~~ 3.0 CPC 7-28-93 ppm; Bg = 130 cpm
16.0	0731	7	6	SAA	CL	2.5	HLT = 3.0 ppm; Bg = 130 cpm; 122744-A
16.5	0731	9	6	SAA Sloan 111	CL	2.5	HLT = 3.0 ppm; Bg = 130 cpm; 122745-A
17.0	0737	7	6	SAA	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm; 122746 A
17.5	0737	12	6	SAA	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm; 122747-A
18.0	0737	14	6	VERY STIFF (10YR, 4/1) DARK GRAY, SILTY CLAY, medium to high PLASTICITY, MOIST. CPC 7-28-93 ~~Sloan 121~~	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm; 122748-A
18.5	0737 122749 122750 ~~122751~~ 122752	7	6	SAA Sloan 121	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm
19.0	0805	11	6	SAA	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm; 122489-A
19.5	0805	11	6	SAA CPC 7-28-93 ~~Sloan 111~~	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm; 122490-A
20.0	0805	14	6	SAA	CL	2.5	HLT = 0.0 ppm; Bg = 130 cpm; 122491 A

NOTES:

Driller - Penn Drill Contractor

Driller -

Helper -

LIC

SAA - Same As Above

Background

HLT - 0.0 ppm

Bg - 130 cpm

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CRW-5 50.03.18	PROJECT NAME. CRW-5	
BORING NUMBER. 11090	COORDINATES:	DATE 07-29-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 07-28-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 07-29-93
DRILLING METHODS: Hollow Stem Auger See p. 1		PAGE 5 OF 5

DEPTH (FT) 20.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
20.5	0805 122492 122493 122494	6	6	VERY STIFF (10YR, 4/1) DARK GRAY, SILTY CLAY, medium to high plasticity, moist. Shown 3	CL	2.5	MT = 0.0 ppm Bg = 130 cpm
				TOTAL DEPTH - 20.5 122495 - Trip Blank			MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES

Driller - Resin Drill Contractor

Driller - See p. 1

Helper -

Background

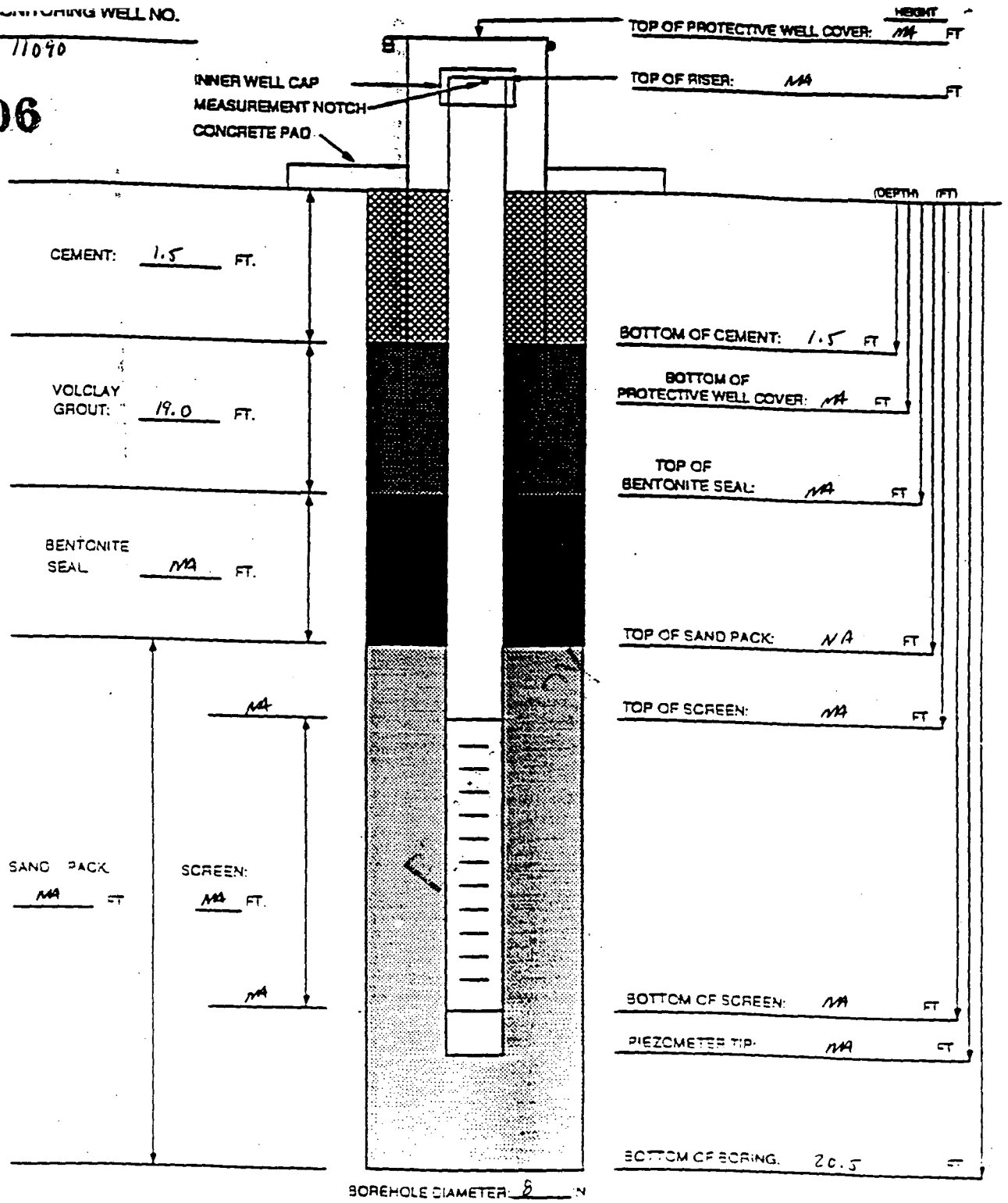
MT - 0.0 ppm

Bg = 13 cpm

MONITORING WELL NO.

11090

4706



BOREHOLE DIAMETER: 8 IN

MATERIALS USED

SAND TYPE AND QUANTITY: NA

BENTONITE PELLETS (5 GALLON BUCKETS): NA

BAGS OF VOLCLAY GROUT: 2

AMOUNT OF CEMENT: 1

AMOUNT OF WATER USED: 25 gal

OTHER

TASK

NOTES

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS NA IN ID. 316 STAINLESS STEEL PIPE WITH 0 NA IN. SLOTS.

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG

GEOLOGIST ENGINEER: D. Costello

4) WATER DEPTH AND DATE ___ FT ___

5) TOP OF CASING IS SECURED WITH STAINLESS STEEL CAP

6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL

* WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Cav-5
PROJECT NO. 50.03.18
BORING NO. 11090
PIEZOMETER NO. 11090

FIELD ENG./GEO. O. Costello DATE 07-29-93
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 07-29-93

BOREHOLE DRILLING

DRILLING METHOD Hollowstem Auger 4¼ ID
DRILLING FLUID (S) USED:
FLUID _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____

TYPE OF BIT Hollowstem Auger 4¼ ID
CASING SIZE (S) USED:
SIZE _____ FROM _____ TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE _____
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL _____
RISER PIPE DIAMETERS: NA
O.D. _____ I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE				
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS:				
(cement) GROUT/SLURRY	0.0 TOP	1.5 BOTTOM	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP NA	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	20.5			
SWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS: NA

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. 11095		
ELEVATION:	COORDINATES:	DATE 7-15-93
ENGINEER/GEOLOGIST O. Costello	GWL: Depth Date/Time	DATE STARTED: 7-15-93
DRILLING METHODS: Hollow Stem Auger 4 1/4 in I.D.	Depth Date/Time	DATE COMPLETED: 7-16-93
		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	1231 121487 A 121488 121489	9	6	MEDIUM DENSE (2.54, 313) DARK OLIVE BROWN, MEDIUM to COARSE GRAINED SAND WITH SUBANG GRAVEL COBBLES. POORLY GRADED. DRY	SC	NA	MT = 0.0 ppm Bg = 50 cpm
1.0	1231	10	6	SAA	SC	NA	MT = 0.0 ppm Bg = 40 cpm 121490-A
1.5	1231 121491 A 121492 121493	7	6	SAA SPOT 1	SC	NA	MT = 0.0 ppm Bg = 40 cpm
2.0	1236	15	6	DENSE (2.54, 413) OLIVE BROWN, MEDIUM to COARSE GRAINED SAND WITH GRAVEL COBBLES, DRY.	SC	NA	MT = 0.0 ppm Bg = 60 cpm 121494-A
2.5	1236	15	6	SAA	SC	NA	MT = 0.0 ppm Bg = 50 cpm 121495-A
3.0	1236 121496 A 121497 121498	16	6	NO RECOVERY SPOT 2	SC	NA	MT = 0.0 ppm Bg = 40 cpm
3.5	1245	11	6	MEDIUM DENSE (10YR, 314) DARK YELLOWISH BROWN, MEDIUM to COARSE GRAINED SAND, POORLY GRADED. DRY.	SC	NA	MT = 0.0 ppm Bg = 50 cpm 121499-A
4.0	1245	11	6	SAA	SC	NA	MT = 0.0 ppm Bg = 40 500 cpm 121500-A
4.5	1245	9	6	SAA SPOT 3	SC	NA	MT = 0.0 ppm Bg = 40 cpm 121501-A
5.0	1305	7	6	VERY STIFF (10YR, 413) BROWN, SILTY CLAY, LOW TO MEDIUM PLASTICITY, DRY.	CL	2.5	MT = 0.0 ppm Bg = 40 cpm 121502-A

NOTES

Driller - Penn Drill
Contractor

Driller - Mike Sinking
Helper - Doug Nelson
Rig - Mobile B-80

SAA Same as above

Background
MT = 0.0 ppm
Bg = 40 cpm

PRELIMINARY

PROJECT NUMBER. CEW-5 50.03.18	PROJECT NAME. 50.03.18		
BORING NUMBER 4706 61073	COORDINATES:	DATE 7-15-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-15-93	
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-15-93	
DRILLING METHODS Hollow Stem Auger 4 1/4 in ID		PAGE 3 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0				DISTINCT COLOR CHANGE			
10.5	1359	9	6	STIFF (2.5Y, 4/2) DARK GRAYISH BROWN, SILTY CLAY MEDIUM PLASTICITY, MOIST Sample 71	CL	1.0	MT = 0.0 ppm Bg = 40 cpm 121917-A
11.0	1410	7	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121918-A
11.5	1410	7	6	MEDIUM DENSE (2.5Y, 5/2) VERY DARK GRAYISH BROWN, CLAYEY SILT, WET	ML	NA	MT = 0.0 ppm Bg = 50 cpm 121919-A
12.0	1410	7	6	STIFF (2.5Y, 4/2) DARK GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, [illegible] of silty laminae WET. TOTAL DEPTH = 12.0 ft	CL	1.5	MT = 0.0 ppm Bg = 50 cpm 121920-A
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES

Driller - Penn Drill
Contractor
Driller - [illegible]
Helper -

Site - [illegible]

Background
MT - 0.0 ppm
Bg = 10 cpm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

11095

INSTALLATION DATE: 07-15-93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT

INNER WELL CAP
MEASUREMENT NOTCH
CONCRETE PAD

CEMENT: 1.5 FT.

Top of Volclay 1.5

VOLCLAY GROUT: 10.5 FT.

BENTONITE SEAL: NA FT.

NA

SAND PACK: NA FT

SCREEN: NA FT

NA

(DEPTH) (FT)

BOTTOM OF CEMENT: 1.5 FT

BOTTOM OF PROTECTIVE WELL COVER: NA FT

TOP OF BENTONITE SEAL: NA FT

TOP OF SAND PACK: NA FT

TOP OF SCREEN: NA FT

BOTTOM OF SCREEN: NA FT

PIEZOMETER TIP: NA FT

BOTTOM OF BORING: 12.0 FT

BOREHOLE DIAMETER 8 IN

MATERIALS USED

WATER PRIOR TO GROUTING: NA
BENTONITE PELLETS IN SAND PACK: NA
VOLCLAY GROUT: 2
PORTLAND CEMENT: 2
WATER USED: 20 Gallons
OTHER:

NOTES

1) RISER PIPE IS NA IN. O.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS
2) SCREEN IS NA IN. O.D. 316 STAINLESS STEEL PIPE WITH NA IN. SLOTS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG
4) WATER DEPTH AND DATE NA
5) TOP OF CASING IS SEALED WITH STAINLESS STEEL CAP
6) PARENTHESES INDICATE GROUND LEVEL
7) [illegible]

DESIGNED BY: O Lugbill

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Cru-5
PROJECT NO. 50.03.18
BORING NO. 11095
PIEZOMETER NO. 11095

FIELD ENG./GEO. O.Costello
CHECKED BY
DATE OF INSTALLATION 07-15-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger 4¼in ID
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED:
SIZE NA FROM NA
SIZE NA FROM NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS NA HOLES NA SCREEN NA
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS: Cement	0.0	1.5	
[illegible]	TOP NA	BOTTOM NA	TOP / BOTTOM
[illegible]	TOP NA	BOTTOM NA	TOP BOTTOM
[illegible]	TOP NA	BOTTOM NA	TOP BOTTOM
[illegible]	TOP NA	BOTTOM NA	TOP BOTTOM
[illegible]	TOP NA	BOTTOM NA	TOP BOTTOM
[illegible]	NA		
[illegible] OF BOREHOLE	12.0		
[illegible] INSTALLATION	NA		

[illegible] PIEZOMETER FLUSHED AFTER INSTALLATION? YES NA NA
[illegible] TEST PERFORMED ON THE PIEZOMETER? YES NA NA

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. 11097	COORDINATES:	DATE 7-13-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS Hollow Stem Auger 4¼ ID		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
1.5	0723 121449 121450 121451	13	6	DENSE (2.5Y, 4/2) DARK GRAYISH BROWN, MEDIUM GRAINED SAND WITH large gravel, cobbles, poorly graded, DRY.	SP	NA	MT = 18.0 ppm Bg = 40 cpm
1.0	0723	11	6	DENSE (2.5Y, 4/2) DARK GRAYISH BROWN, MEDIUM GRAINED SAND, poorly graded, DRY	SP	NA	MT = 18.0 ppm Bg = 40 cpm 121452 - Archive
1.5	0723 121453 121454 121455	24	0	SAA Sample 1	SP	NA	MT = 19.0 ppm Bg = 40 cpm
2.0	0735	11	6	SAA	SP	NA	MT = 19.0 ppm Bg = 50 cpm 121456 Archive
2.5	0735	8	6	VERY STIFF (2.5Y, 5/1) DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY	CL	2.0	MT = 19.0 ppm Bg = 50 cpm 121457 - Archive
3.0	0735 121458 121459 121460	9	6	VERY STIFF (2.5Y 4/2) DARK GRAY BROWN, SILTY CLAY, iron staining, medium plasticity, dry. Sample 2	CL	2.5	MT = 19.0 ppm Bg = 50 cpm
3.5	0815	8	6	STIFF (2.5Y, 5/4) light olive brown, silty clay, medium plasticity, DRY.	CL	1.5	MT = 0.0 ppm Bg = 60 cpm
4.0	0815	8	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 50 cpm 121462 - Archive
4.5	0815	9	6	medium stiff (2.5Y, 5/4) light olive brown clayey silt, moist Sample 3	ML	1.0	MT = 0.0 ppm Bg = 60 cpm 121463 - Archive
5.0	0837	7	6	HARD (2.5Y, 5/6) light olive brown, silty clay, low plasticity, some silty laminae, dry	CL	4.5	MT = 2.0 ppm Bg = 50 cpm 121464 - Archive

NOTES

Driller - Rexon Drill
Contractor

Driller - Mike Smiley
Helper - Mike Cantrell

Rig - Mobile B61

SAA - Same As Above

Background
MT = 0.0 ppm
Bg = 50 60 cpm

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. 50.03.18		
BORING NUMBER. B 11067	COORDINATES:		DATE 7-13-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7-13-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Hollow Stem Auger 4¼ ID			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
5.5	0037	9	6	Hard (2.5Y5/6) light olive brown, silty clay low plasticity; some silty laminae, Dry	CL	4.5	MT 2.0. ppm Bg = 60 cpm 121465 - Archive
6.0	0037	12	6	SAA Sloughing	CL	4.5	MT = 2.0 ppm Bg = 60 cpm 121466 - Archive
6.5	~~0037~~ 0037 7-13-93 1152 121467 121468 ~~121469~~	5	6	STIFF (2.5Y, 5/4) light olive brown silty clay medium plasticity, Dry.	CL	1.5	MT = 0.0 ppm Bg = 60 cpm
7.0	1152	6	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121470 Archive
7.5	1152	8	6	SAA Sloughing	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121471 - Archive
8.0	1152	8	6	VERY STIFF (2.5Y, 5/4) OLIVE BROWN, SILTY CLAY with silt laminae, Dry	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121472 - Archive
8.5	1200	7	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121473 - Archive
9.0	1200 1225	9	6	SAA Sloughing	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121474 - Archive
9.5	~~1200~~ 1200 7-13-93 121475 121476 121477	2	6	STIFF (2.5Y, 5/4) olive brown, silty clay; medium plasticity; silty partings, moist	CL	1.5	MT = 0.0 ppm Bg = 60 cpm
10.0	1225	5	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121478 Archive

NOTES:

Driller - Penn Drill
Contractor

Driller - Mike Smith
Helper - Mike Cartney

SAA - Same as Above

Background
MT = 0.0 ppm
Bg = 50.00 cpm

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CEW-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. Boring 11097	COORDINATES:	DATE 7-13-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-13-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS: Hollow Stem Auger 4 1/4 ID		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							
10.5	1225	9	6	MEDIUM DENSE (2.5Y, 5/6), olive yellow, Clayey Silt, moist. Sample 7 ↑	ML	NA	MT = 0.0 ppm Bg = 50 cpm 121479-Archive
11.0	1242	5	6	MEDIUM DENSE (2.5Y, 4/2) Dark Olive Gray Clayey Silt, wet	ML	NA	MT = 0.0 ppm Bg = 60 cpm 121480-Archive
11.5	1242	11	6	SAA wet	ML	NA	MT = 0.0 ppm Bg = 60 cpm 121481-Archive
12.0	1242	10	6	SAA wet ↑ 12.0 = Total Depth, Sample	ML	NA	MT = 0.0 ppm Bg = 60 cpm 121482-Archive
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES

Driller - Penn Drill Contractor

Driller - Mike Bailey

Helper - Mike Contrad

Rig Mobil 80

SAA - Same As Above

Background

MT - 0.0 PP

Bg = 50-60 cpm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

106

INSTALLATION DATE: 7-13-93

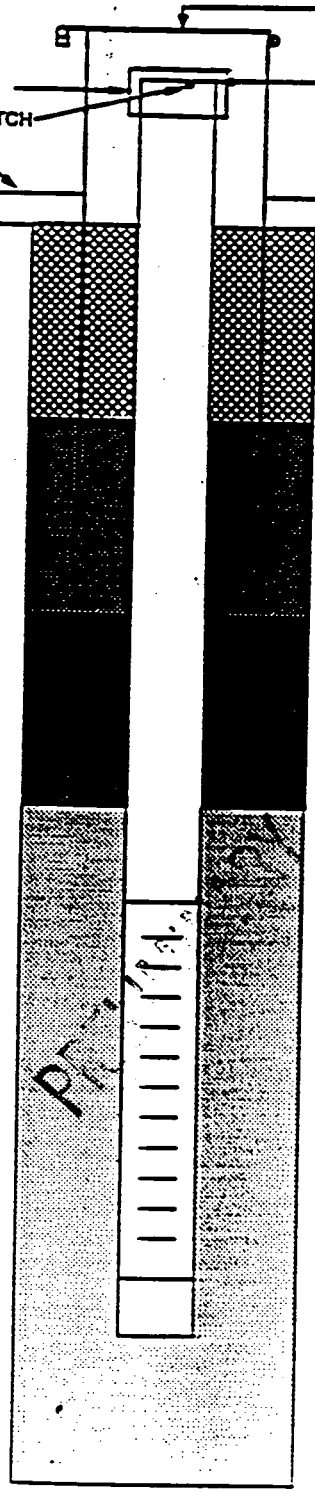
TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

INNER WELL CAP

MEASUREMENT NOTCH

CONCRETE PAD

TOP OF RISER: NA FT



(DEPTH) (FT)

CEMENT: 1.5 FT.

Top Grout 1.5

BOTTOM OF CEMENT: 1.5 FT

VOLCLAY GROUT: 10.5 FT.

BOTTOM OF PROTECTIVE WELL COVER: NA FT

TOP OF BENTONITE SEAL: NA FT

BENTONITE SEAL NA FT.

TOP OF SAND PACK: NA FT

NA

TOP OF SCREEN: NA FT

SAND PACK: NA FT

SCREEN: NA FT

NA

BOTTOM OF SCREEN: NA FT

PIEZOMETER TIP: NA FT

BOTTOM OF BORING: 12.0 FT

BOREHOLE DIAMETER _____ IN

WATER ADDED

[illegible] NA

BENTONITE PELLETS [illegible] NA

[illegible] GROUT 2

[illegible] CEMENT 1

[illegible] WATER USED 20 [illegible]

NOTES

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.

2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH [illegible] NA SLOTS.

3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG.

4) WATER DEPTH AND DATE NA

5) TOP OF CASING IS SECURED [illegible] STAINLESS STEEL CAP

6) PARENTHESES [illegible] OR BLANK [illegible]

[illegible]

DECLARED BY [illegible] U. [illegible]

RI/FS

PIEZOMETER INSTALLATION SHEET 4706

PROJECT NAME Crw 5 50.03.18
PROJECT NO. 50.03.18
BORING NO. 11097
PIEZOMETER NO. 11097

FIELD ENG./GEO. O. Costello DATE 7-14
CHECKED BY DATE
DATE OF INSTALLATION 7-14-93 13 apc 7-14-97

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 4¼ inch ID auger
CASING SIZE (S) USED:
SIZE NA FROM NA NA
SIZE NA FROM NA NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS NA HOLES NA SCREEN NA
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS:			
Cement GROUT SLURRY	TOP 0.0	BOTTOM 1.5	TOP BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP BOTTOM
SAND	TOP NA	BOTTOM NA	TOP BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP BOTTOM
PIEZOMETER TIP	NA		
BOTTOM OF BOREHOLE	12.0		
DATE AFTER INSTALLATION	NA		

WAS PIEZOMETER FLUSHED AFTER INSTALLATION? YES ___ NO ___
WERE ANY TEST PERFORMED ON THE PIEZOMETER? YES ___ NO ___

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. Boring 11099	
BORING NUMBER. 11099	COORDINATES: NA	DATE 7-10-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 7-10-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-11-93
DRILLING METHODS Hollow Stem Auger		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	1105 121401 121402 121403	22	6	Dense (10YR, 4/4) Dark yellowish Brown, coarse grained sand with large gravel pebbles, well graded, Dry.	SW	NA	MT = 0.0 ppm Bg = 160 cpm ~~121411 Archive~~
1.0	1105	21	6	Dense (10YR, 4/4) Dark yellowish Brown, coarse grained sand with a few gravel pebbles, poorly graded, Dry.	SP	NA	MT = 0.0 ppm 1214 Arc Bg = 160 cpm ~~121412 Archive~~
1.5	1105 121405 121406 121407	10	6	SAA Spoon 1 ↑	SP	NA	MT = 0.0 ppm Bg = 160 cpm
2.0	1110	7	6	SAA	SP	NA	MT = 0.0 ppm Bg = 170 cpm 121408 - Archive
2.5	1110	8	6	Very Stiff (10YR, 4/1) Dark gray, medium plasticity, Silty Clay, Dry.	CL	2.0	MT = 0.0 ppm Bg = 160 cpm 121409 - Archive
3.0	1110 121410 121411 121412	8	6	SAA Spoon 2 ↑	CL	2.0	MT = 0.0 ppm Bg = 160 cpm
3.5	1115	7	6	Stiff (5Y, 3/1) Very Dark Gray, Silty Clay, Medium to high plasticity, dry.	CL	1.0	MT = 0.0 ppm Bg = 170 cpm 121413 - Archive
4.0	1115	8	6	SAA	CL	1.0	MT = 0.0 ppm Bg = 170 cpm 121414 - Archive
4.5	1115	8	3	SAA Spoon 3 ↑	CL	1.5	MT = 0.0 ppm Bg = 180 cpm 121415 - Archive
5.0	1140	4	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 160 cpm 121416 - Archive

NOTES

Driller - Penn Drill
Contractor

Driller - Kevin Myers
Helper - Mike Leon

Rig - Mobile B-61

SAA: Same as above

Background
MT = 0.0 pp
Bg = 160-180 cp

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER: CB-5 50.03.18	PROJECT NAME: CLUS 50.03.18 Boeing 11099	
BORING NUMBER: 11099	COORDINATES: NA	DATE: 7-10-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED: 7-10-93
ENGINEER/GEOLOGIST: O. Costello	Depth Date/Time	DATE COMPLETED: 7-11-93
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
5.5	1140	8	6	STIFF (5Y, 3/1) VERY DARK GRAY, SILTY CLAY, MEDIUM TO HIGH PLASTICITY, DRY.	CL	1.0	HT = 0.0 ppm; Bg = 150 cpm
6.0	1140	6	6	MEDIUM DENSE (5YR, 5/1) BLACK, CLAYEY SILT DRY. Sample 4 ↑	ML	NA	HT = 0.0 ppm; Bg = 160 cpm
6.5	1210, 121419, 121420, 121421	4	6	STIFF (5Y, 3/1) VERY DARK GRAY, SILTY CLAY MEDIUM PLASTICITY, DRY.	CL	1.0	HT = 0.0 ppm; Bg = 150 cpm
7.0	1210	6	6	VERY STIFF (2.5Y, 3/2) VERY DARK GRAYISH BROWN, SILTY CLAY, LOW PLASTICITY, DRY.	CL	2.5	HT = 0.0 ppm; Bg = 120 cpm
7.5	1210	11	6	VERY STIFF (10YR, 3/3) DARK BROWN, SILTY CLAY LOW PLASTICITY, DRY. Sample 5 ↑	CL	2.5	HT = 0.0 ppm; Bg = 160 cpm
8.0	1226	2	6	VERY STIFF (10YR, 3/2) VERY DARK GRAYISH BROWN SILTY CLAY, MEDIUM PLASTICITY, DRY.	CL	2.5	HT = 0.0 ppm; Bg = 170 cpm
8.5	1226	4	6	VERY STIFF (10YR, 4/4) DARK YELLOWISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY.	CL	2.5	HT = 0.0 ppm; Bg = 180 cpm
9.0	1226	7	6	SAA Sample 6 ↑	CL	1.5	HT = 0.0 ppm; Bg = 170 cpm
9.5	1236, 121427, 121428, 121429	2	6	VERY STIFF (10YR, 4/4) DARK YELLOWISH BROWN SILTY CLAY, MEDIUM PLASTICITY, DRY.	CL	2.0	HT = 0.0 ppm; Bg = 170 cpm
10.0	1236	4	6	SAA	CL	2.0	HT = 0.0 ppm; Bg = 180 cpm

NOTES

Driller - Resin Drill Contractor

Driller - Kevin Myers

Helper - Mike Lein

Rig Mobile 80

SAA - Same as Above

Background

HT = 0.0 ppm

Bg = 160-180 cpm

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CW-5 50.03.18	PROJECT NAME. Boring 11099.	
BORING NUMBER. 11099	COORDINATES. NA	DATE 7-10-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 7-10-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-11-93
DRILLING METHODS: Hollow Stem Auger		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							
10-93 11-93 12.5		6	6	VERY STIFF (10YR, 4/4) DARK YELLOWISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, DRY 10.25 MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN CLAYEY SILT WITH COARSE SILTY PARTINGS, DRY. SPECIMEN 7 ↑	CL / ML	2.0 / —	MT = 0.0 ppm Bg = 180 cpm
11.0		5	6	STIFF (10YR, 4/4) DARK YELLOWISH BROWN, SILTY CLAY MEDIUM PLASTICITY, MOIST. SOME SILTY LAMINAE THROUGHOUT	CL	1.5	MT = 0.0 ppm Bg = 170 cpm
11.5		5	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 180 cpm
12.0		7	6	SAA SPECIMEN 8 ↑	CL	1.5	MT = 0.0 ppm Bg = 170 cpm
12.5		3	6	STIFF (10YR, 4/3) DARK BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST. SILTY PARTINGS.	CL	1.5	MT = 0.0 ppm Bg = 180 cpm
13.0		3	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 180 cpm
13.5		3	6	MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN, CLAYEY SILT, MOIST 13.25 STIFF (10YR, 4/3) DARK BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST. SPECIMEN 9 ↑	ML / CL	NA / 1.5	MT = 0.0 ppm Bg = 180 cpm
14.0		5	6	SAA, MOIST	CL	1.5	MT = 0.0 ppm Bg = 170 cpm
14.5		7	6	SAA, MOIST	CL	1.5	MT = 0.0 ppm Bg = 180 cpm
15.0		15	6	MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN CLAYEY SILT, WET. LOTS OF WATER IN THE SPOON. SPECIMEN 10 ↑	ML	NA	MT = 0.0 ppm Bg = 180 cpm

NOTES

Driller - Penn Drill
Contractor

Driver - Kevin Myers
Helper - Mike Smiley

Rig Mobile 80

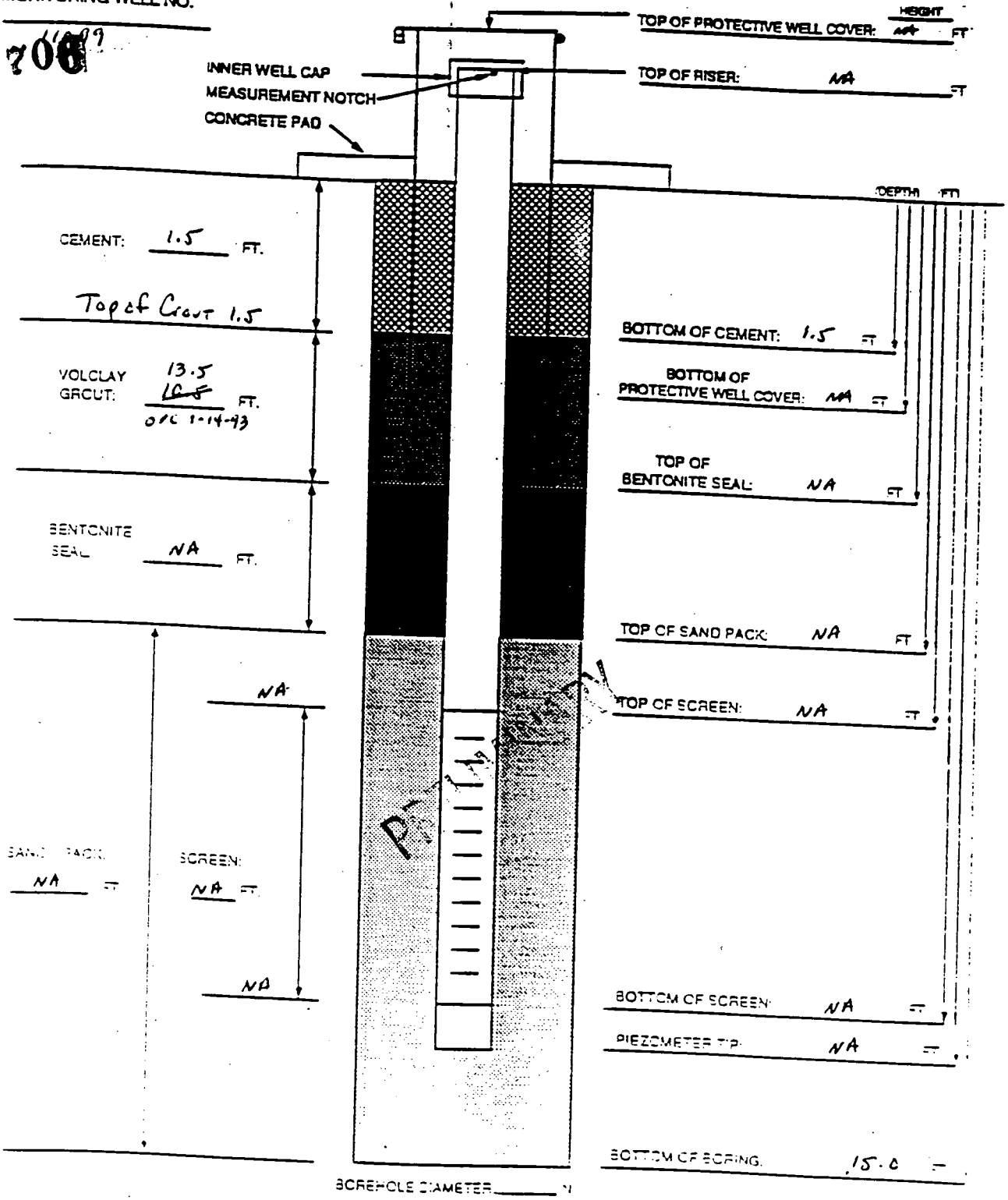
SAA - Same as Above

Background
MT = 0.0 ppm
Bg = 180 cpm

INSTALLATION DIAGRAM
MONITORING WELL NO.

706

INSTALLATION DATE: 7-12-93



BOREHOLE DIAMETER _____ IN

WATER USED

RISER PIPE DIAMETER	NA
BENTONITE PELLETS	NA
	3
	1
WATER USED	25 Gallons

NOTES

1) RISER PIPE IS NA IN. O.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS
2) SCREEN IS NA IN. O.D. 316 STAINLESS STEEL PIPE WITH NA IN. SLOTS
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OF THREADED PIPE
DECISION MADE BY: O. Gustafson

4) WATER DEPTH AND DATE: NA
5) TOP OF RISER USED: STAINLESS STEEL

FEDERAL
RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME GRO-S 50.03.18
PROJECT NO. 50.03.18
BORING NO. 11099
PIEZOMETER NO. 11099

FIELD ENG./GEO. O. Costello
CHECKED BY
DATE OF INSTALLATION 7-12-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 4¼" inch ID augers
CASING SIZE (S) USED:
SIZE NA FROM NA
SIZE NA FROM NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS NA HOLES NA SCREEN NA
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement	0.0 TOP 1.5	1.5 BOTTOM 15.0	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
[illegible]	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
SAND	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0			
TOP AFTER INSTALLATION	NA			

PIEZOMETER FLUSHED AFTER INSTALLATION? YES ___ NO ___
TEST PERFORMED ON THE PIEZOMETER? YES ___ NO ___

4706

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. 11100	COORDINATES:	DATE 7-22-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-22-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-22-93
DRILLING METHODS: Hollow Stem Auger		PAGE 1 OF 34

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 6in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (OPC 7-23-93)
0.0							
0.5	0925 121928 121929 121930	16	6	DENSE (10YR 3/2) VERY DARK GRAYISH BROWN MEDIUM to COARSE GRAINED SAND, SOME PLANT MATTER, SOME GRAVEL COBBLES, DRY.	SC	NA	MT = 5.0 ppm Bg = 60 cpm
1.0	0925	17	6	SAA	SC	NA	MT = 5.0 ppm Bg = 60 cpm 121931-A
1.5	0925 121932 121933 121934	12	6	DENSE (10YR, 3/2), VERY DARK GRAYISH BROWN MEDIUM to COARSE GRAINED SAND, SOME GRAVEL COBBLES, DRY. Sample 1	SC	NA	MT = 5.0 ppm Bg = 60 cpm
2.0	0929	21	6	SAA HARD (10YR, 5/6) YELLOWISH BROWN, SILTY CLAY, LOW PLASTICITY, DRY 1.75	SC CL	NA 4.0+	MT = 1.5 ppm Bg = 70 cpm 121935-A
2.5	0929	12	6	SAA	CL	4.0+	MT = 1.5 ppm Bg = 70 cpm 121936-A
3.0	0929 121937 121938 121939	11	6	SAA Sample 2	CL	4.0+	MT = 1.5 ppm Bg = 70 cpm
3.5	0940	7	6	HARD (10YR, 4/6) DARK YELLOWISH BROWN, LOW TO MEDIUM PLASTICITY, SILTY CLAY, DRY.	CL	4.0	MT = 0.0 ppm Bg = 60 cpm 121940-A
4.0	0940	11	6	VERY STIFF (10YR, 4/6) DARK YELLOWISH BROWN LOW TO MEDIUM PLASTICITY, SILTY CLAY, DRY	CL	3.0	MT = 0.0 ppm Bg = 60 cpm 121941-A
4.5	0940	12	6	STIFF (10YR, 4/6) DARK YELLOWISH BROWN, LOW TO MEDIUM PLASTICITY, SILTY CLAY, DRY. Sample 3	CL	2.0	MT = 0.0 ppm Bg = 60 cpm 121942-A
5.0	1000	8	6	VERY STIFF (10YR, 3/3) BROWN, SILTY CLAY, LOW to MEDIUM plasticity, DRY	CL	4.0	MT = 0.0 ppm Bg = 65 cpm 121943-A

NOTES

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - Roger Davis

Rig Mobile 80

SAA - Same As Above

Background
MT = 0.0 pp
Bg = 60-75 c

PROJECT NUMBER. CEU-5 50.03.18 | PROJECT NAME. 50.03.18

BORING NUMBER. 11100 | COORDINATES: | DATE 7-22-93

ELEVATION: 4708 | GWL: Depth Date/Time | DATE STARTED: 7-22-93

ENGINEER/GEOLOGIST O. Costello | Depth Date/Time | DATE COMPLETED: 7-23-93

DRILLING METHODS: Hollow Stem Auger | PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS (OPC 7-23-93)
5.0							
5.5	1006	14	6	Very stiff (10YR, 5/3) Brown, silty clay Low to medium plasticity, Dry	CL	4.0	HT = 0.0 ppm; Bg = 65 cpm; 121944
6.0	1006	16	6	SAA slow 4	CL	4.0	HT = 0.0 ppm; Bg = 65 cpm; 121945
6.5	1014; 121946; 121947; 121948	7	6	SAA	CL	4.0	HT = 0.0 ppm; Bg = 70 cpm
7.0	1014	11	6	SAA	CL	4.0	HT = 0.0 ppm; Bg = 70 cpm; 121949
7.5	1014	14	6	SAA slow 5	CL	4.0	HT = 0.0 ppm; Bg = 70 cpm; 121950
8.0	1029	5	6	Very stiff (10YR, 5/3) Brown, silty clay with 1/8 in laminae of silt, medium plasticity, Dry	CL	3.0	HT = 0.0 ppm; Bg = 65 cpm; 121951
8.5	1029	9	6	SAA	CL	3.0	HT = 0.0 ppm; Bg = 65 cpm; 121952
9.0	1029	10	6	SAA slow 6	CL	3.0	HT = 0.0 ppm; Bg = 65 cpm; 121953
9.5	1037; 121954; 121955; 121956	3	6	Very stiff (10YR, 5/3) Brown, silty clay with 1/2 in. silt laminae, medium plasticity Dry	CL	2.5	HT = 0.0 ppm; Bg = 60 cpm
10.0	1037	6	6	Stiff (10YR, 5/3) Brown, silty clay with 1/2 in silt laminae, medium plasticity, Dry	CL	2.0	HT = 0.0 ppm; Bg = 60 cpm; 121957

NOTES

Driller - Penn Drill Contractor

Driller - Mr. Bantley

Helper - Roger Davis

Rig Mobile 80

Background HT = 0.0 ppm Bg = 60-75 cpm

5 50.03.18	PROJECT NAME. CLW-5	
0	COORDINATES:	DATE 7-22-93 4206
	GWL: Depth Date/Time	DATE STARTED: 7-22-93
O. Costello	Depth Date/Time	DATE COMPLETED: 7-23-93
Hollow Stem Auger		PAGE 3 OF 4

RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
6	SOFT (10YR, 3/1) VERY DARK GRAY, SILTY CLAY, MEDIUM TO HIGH PLASTICITY, MOIST. Spoon 7 ↑	CL	.5	MT = 0.0 ppm Bg = 50 cpm 121958-A
6	STIFF (10YR, 3/1) VERY DARK GRAY, SILTY CLAY, MEDIUM to high plasticity, MOIST. Very few silt laminae.	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121959-A
6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121960-A
6	SAA- except wet. Spoon 8 ↑	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121961-A
6	SOFT (2.5Y, 5/4) light olive brown, silty clay, medium plasticity & wet.	CL	.5	MT = 0.0 ppm Bg = 50 cpm
6	LOOSE (2.5Y, 4/2) DARK GRAY BROWN, CLAYEY SILT, small gravel pebbles throughout, wet.	ML	NA	MT = 0.0 ppm Bg = 50 cpm 121969-A
0	NO RECOVERY DUE TO PREVIOUS HYDROPUNCH INSERTION THROUGH THIS ZONE. Spoon 9 ↑	NA	NA	MT = 0.0 ppm Bg = 50 cpm NO RECOVERY
6	LOOSE (2.5Y, 4/2) DARK GRAY BROWN, CLAYEY SILT, small gravel pebbles, wet.	ML	NA	MT = 0.0 ppm Bg = 60 cpm 121971-A
6	VERY STIFF (2.5Y, 3/2) very DARK grayish brown, silty CLAY with gravel pebbles, low plasticity, MOIST.	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121972-A
6	SAA Spoon 10 ↑	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121973-A

SAA- Same As Above

Background
MT - 0.0 ppm
Bg = 50-60 cpm

M. Bentley
Roger Davis

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU 5		
BORING NUMBER. 11100	COORDINATES:		DATE 7-23-93
ELEVATION: 4706	GWL.: Depth	Date/Time	DATE STARTED 7-22-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-23-93
DRILLING METHODS Hollow Stem Auger			PAGE 4 OF 4

DEPTH (FT) 15.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
15.5	0847 121974 121975 121976	7	6	~~LOOSE~~ MEDIUM DENSE (54, 412) Fine grained clayey SAND, poorly graded, wet.	SC	NA	MT = 0.0 ppm Bg = 50 cpm
11.0	0847	7	6	SOFT, (54, 311) very dark gray, silty clay, medium plasticity, wet	CL	.5	MT = 0.0 ppm Bg = 50 cpm 121981-A
16.5	0847	8	6	SAA Spoon 11	CL	.5	MT = 0.0 ppm Bg = 50 cpm 121977-A
17.0	0904	6	6	SOFT (54, 411) dark gray silty clay, medium plasticity, wet.	CL	.5	MT = 0.0 ppm Bg = 60 cpm 121978-A
17.5	0904	6	6	SAA	CL	.5	MT = 0.0 ppm Bg = 60 cpm 121974-A
18.0	0904	10	6	SAA Total Depth 18.0 ft. Spoon 12	CL	.5	MT = 0.0 ppm Bg = 60 cpm 121980-A
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - Roger Davis

Rig Mobile 80

SAA - Same As Above

Background

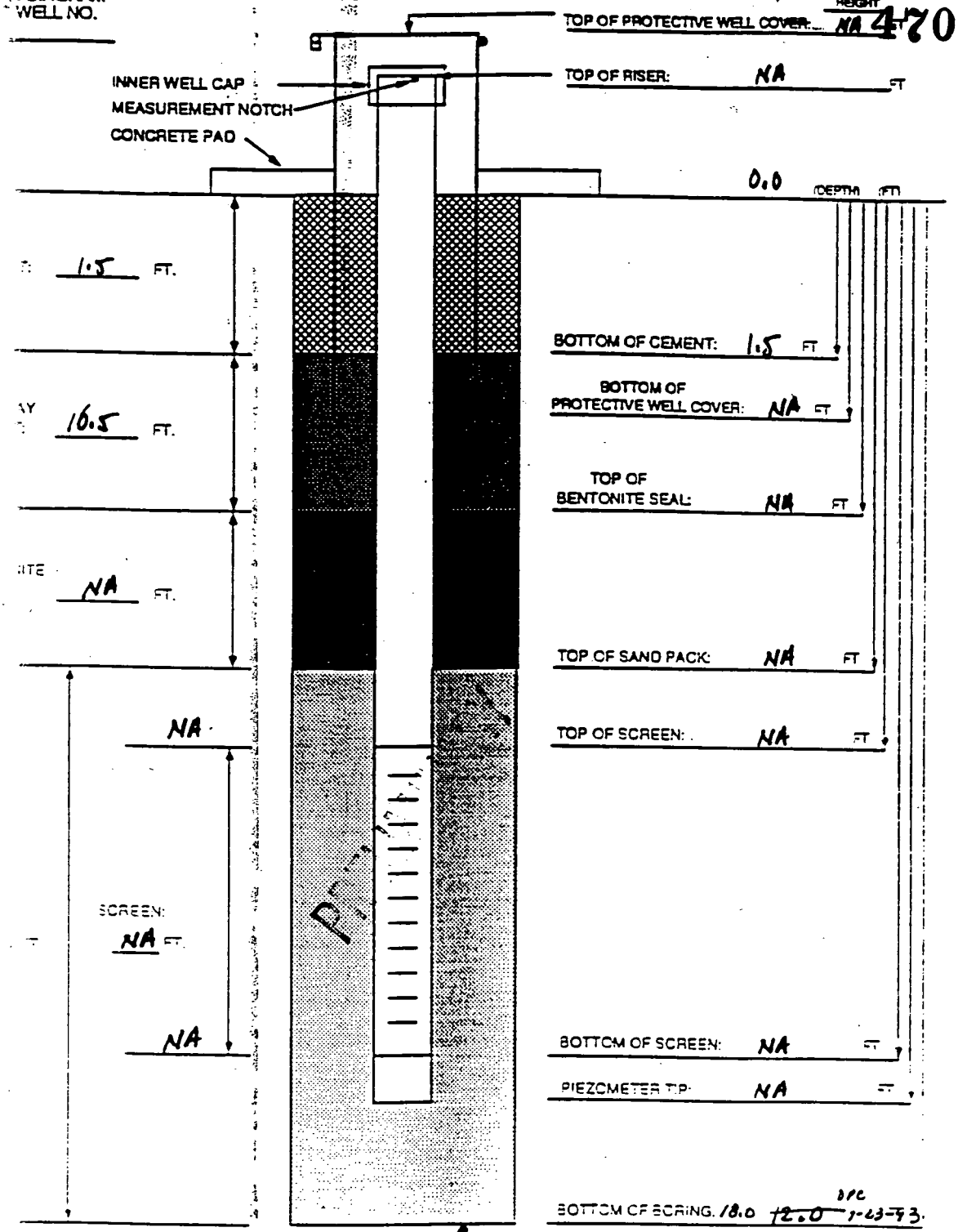
MT - 0.0 ppm

Bg = 50-60 cpm

RI/FS
N DIAGRAM
WELL NO.

INSTALLATION DATE: 7-22-93

4706



NA
NA
2
20 gallons

NOTES:

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.

GEOLOGIST/ENGINEER O. Costello

4) WATER DEPTH AND DATE NA
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING IS [illegible] COVER WITH [illegible]

RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME C2V-5
PROJECT NO. 50.03.18
BORING NO. 11100
PIEZOMETER NO. 11100

FIELD ENG./GEO. O. Costello DATE 7-22-
CHECKED BY _____ DATE _____

DATE OF INSTALLATION 7-22-93

BOREHOLE DRILLING

DRILLING METHOD Hollowstem Auger 6¼ ID
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Stem Auger 6¼" ID
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE _____
DIAMETER OF PERFORATED SECTION _____
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL _____
RISER PIPE DIAMETERS:
O.D. NA
LENGTH OF PIPE SECTIONS _____
JOINING METHOD _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH _____
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS: CEMENT	TOP 0.0 OPC 7-22-93 ~~NA~~ 1.5	BOTTOM 1.5 OPC-7-22-93 ~~NA~~ 12.0 OPC 7-23-93	TOP 18.0
BENTONITE	TOP NA	BOTTOM NA	TOP
[illegible]	TOP NA	BOTTOM NA	TOP NA
GRAVEL	TOP NA	BOTTOM NA	TOP
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP
PIEZOMETER TIP	NA		
BOTTOM OF BOREHOLE	12.0		
TIME AFTER INSTALLATION	NA		

WAS PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐
WERE ANY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NA
NA

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5		
BORING NUMBER: B# 11103	COORDINATES:		DATE: 7-27-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7-27-93
ENGINEER/GEOLOGIST: RILEY	Depth	Date/Time	DATE COMPLETED: 7-27-93
DRILLING METHODS: AUGER USING CME			PAGE 1 OF 5

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS GRAVEL 3700 cpm
0.0	122182 122183 122184 8840	NA	6	HARD (2.5Y 6/4) LIGHT YELLOWISH BROWN CLAYEY GRAVEL (POORLY SORTED, MEDIUM GRAINED), MOIST	GC	4.0	MICROTIP = 0.0 ppm BG = 3700 cpm
0.5	122185		6	VERY STIFF, LIGHT YELLOWISH BROWN (2.5Y 6/4) SILT & CLAY, WITH SOME MED. GRAVEL, MED. PLASTIC, MOIST	CL	3.5	BG = 500 cpm
1.0	122186 122187 122188		6	STIFF SAA	CL	1.75	BG = 60 cpm
1.5	122189		6	STIFF, LIGHT OLIVE BROWN (2.5Y 5/4), SILTY CLAY, MED TO HIGH PLASTICITY, MOIST	CL	1.0	MICROTIP = 0.0 ppm BG = 80 cpm
2.0	122190		6	STIFF, LIGHT OLIVE BROWN (2.5Y 5/4) SILTY CLAY, WITH TRACE OF FINE SAND, MED. PLASTICITY, MOIST	CL	1.25	BG = 60 cpm
2.5	122191 122192 122193		6	STIFF, VERY DARK GRAY (5Y 3/1) SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	2.0	BG = 90 cpm
3.0	122194		TB SOILS 6	SAA	CL	2.0	MICROTIP = 0.2 ppm BG = 80 cpm
3.5	122195		TB WATER 6	NO RECOVERY	NA	NA	
4.0	122196		6	NO RECOVERY	NA	NA	
4.5		NA	6	NO RECOVERY	NA	NA	MICROTIP = ppm BG = cpm
5.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: AUGER - CME
Driller: B. ERICKSON
Helper: Z. THOMAS

SAA = Same As Above
N/A = Not Applicable

Background = MT = 0.0 ppm BG = 80 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

122195 TRIP BLANK SOILS
122196 TRIP BLANK WATER

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: 11103	COORDINATES:	DATE: 7-27-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 7-27-93	
ENGINEER/GEOLOGIST: RILEY	Depth / Date/Time	DATE COMPLETED: 7-27-93	
DRILLING METHODS: AUGER USING CME		PAGE 2 OF 5	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	122600 0915	NA	6	VERY STIFF, GRAY (10YR 5/1) SILTY CLAY, WITH TRACE OF FINE SAND, MED. PLASTIC, MOIST MOTTED WITH BROWNISH YELLOW (10YR 6/6)	CL	2.25	SEE PREVIOUS PAGE BY 80 CPM MT 0.8 PPM
5.5	122602			SAA	CL	2.5	
6.0	122603 122604 122605			SAA	CL	2.0	MICROTIP = 0.0 PPM BY = 80 CPM
6.5	122606			STIFF SAA	CL	1.5	
7.0	122607			STIFF SAA	CL	1.25	
7.5	122608			VERY STIFF, GRAY (10YR 6/1), SILTY CLAY, MOTTED W/ BROWNISH YELLOW (10YR 6/6), MED PLASTIC, MOIST	CL	2.25	MICROTIP = 0.0 PPM BY = 80 CPM
8.0	122609			SAA VERY MOIST	CL	2.25	
8.5	122610			SAA WITH SOME SAND VERY MOIST	CL	2.25	
9.0	122611 122612 122613			SAA	CL	2.25	MICROTIP = 0.0 PPM BY = 80 CPM
9.5	122614	NA	6	SAA	CL	3.5	
10.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER - CME
Driller : B. ERICKSON
Helper : R. THOMAS

SAA = Same As Above
N/A = Not Applicable

Background = SEE PAGE 1

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: CRU 5 50.03.18	PROJECT NAME: CRU 5		
BORING NUMBER: B# 1103	COORDINATES:	DATE: 7-27-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-27-93	
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 7-27-93	
DRILLING METHODS:		PAGE 3 OF 5	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0	122615 0950	NA	6	SAA	CL	1.25	SEE PREVIOUS PAGE
10.5	122616			SAA	CL	3.0	MICROTIP = 0.0 PPM BZ = 70 CPM
11.0	122617			SAA	CL	3.25	
11.5	122618			SAA	CL	2.0	
12.0	122619 122620 122621			STIFF, GRAY (2.5Y 6/1), SILTY CLAY MOD. PLASTICITY, VERY MOIST (TWIGS)	CL	1.25	MICROTIP = 0.0 PPM BZ = 70 CPM
12.5	122622			SAA WITH SOME FINE SAND	CL	2.0	
13.0	122623			SOFT, LIGHT OLIVE BROWN (2.5Y 5/6) POORLY GRADED SILTY SAND, WITH TRACE OF GRAVEL, WET	SM	NA	
13.5	122624			SAA.	SM		MICROTIP = 0.0 PPM BZ = 70 CPM
14.0	122625			SOFT, GRAY (2.5Y 5/1), POORLY GRADED FINE SAND, WITH TRACE OF GRAVEL, WET	SP		
14.5	122626	NA	6	SOFT, GRAYISH BROWN (2.5Y 5/2) POORLY GRADED FINE SAND, WITH TRACE OF GRAVEL, WET.	SP	NA	
15.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: TUCKER CME
Driller: E. ERICKSON
Helper: R. THOMAS

SAA = Same As Above
N/A = Not Applicable
Background = SEE PAGE 1

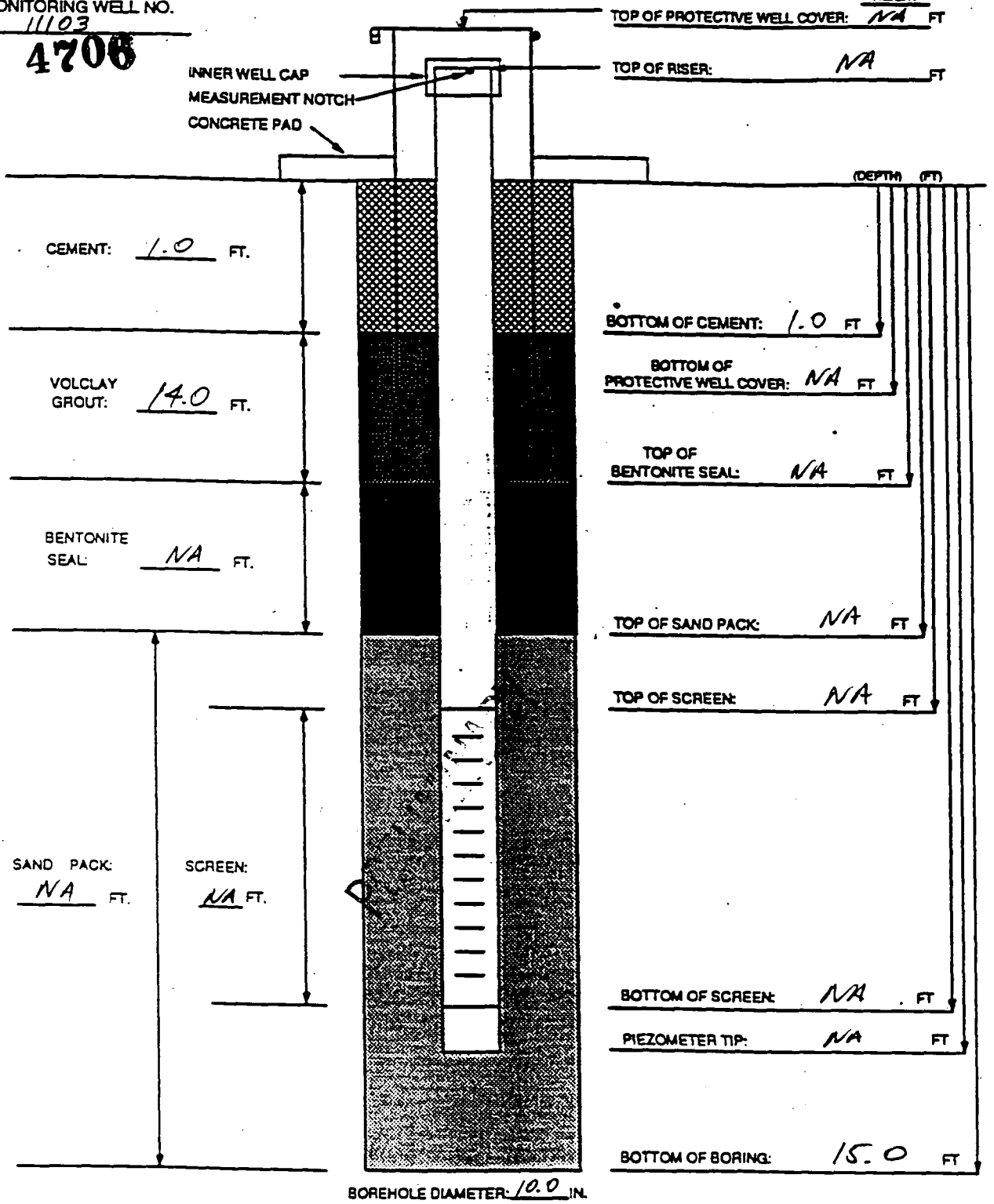
* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

122627 ← CROSS N/A HYDROPUNCH
122628 ~ VOA.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11103

4706

INSTALLATION DATE: 7-28-93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 6 BAGS
AMOUNT OF CEMENT:
AMOUNT OF WATER USED:
OTHER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE ____FT/____
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: PAT RILEY

ASI FORM 0157 REV (0)

PIEZOMETER INSTALLATION SHEET

4706

PROJECT NAME CRU 5 PHASE II
FIELD ENG./GEO. RILOY DATE
PROJECT NO. 50.03.18
CHECKED BY DATE
BORING NO. 11103
PIEZOMETER NO. NA
DATE OF INSTALLATION ~~6-2~~ 7-28-93 PA 7-28-93

BOREHOLE DRILLING

DRILLING METHOD AUGER - CME
TYPE OF BIT AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION GROUTED UP TO 1.0
CONCRETE TO 0.0 FT

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 15.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	15.0 FT			
GWL AFTER INSTALLATION	11.9 FT			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS NA

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS/PHASE II		
BORING NUMBER 1104	COORDINATES		DATE 28JUL93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 28JUL93
ENGINEER/GEOLOGIST B. E. MULLER	Depth	Date/Time	DATE COMPLETED 28JUL93
DRILLING METHODS HOLLOW STEM AUGER SPLIT SPOON			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	122588 122589 122590	14	6	HARD (2.5Y, 4/4) OLIVE BROWN SILTY CLAY, TRACE SAND GRAVEL LOW PLASTICITY SLIGHTLY MOIST	CL	>4.5	MT: 0 BY: 100 A
1	122591 28JUL 1313 122592	12	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE SAND LOW PLASTICITY, SLIGHTLY MOIST	CL	4.0	ARC
	122593 122594	15	2/2	VERY STIFF (2.5Y, 4/4) OLIVE BROWN SILTY CLAY, TRACE SAND, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.0	TIME 1313 A
2	122595 28JUL 1330 122596	12	6	VERY STIFF (2.5Y, 5/6) LIGHT OLIVE BROWN SILTY CLAY, LOW PLASTICITY, SLIGHTLY MOIST	CL	3.0	MT: 0 BY: 120 ARC
		10	6	SAA	CL	1.5	ARC
3	122597 122598 122599	11	2/2	SAA	CL	>4.5	TIME 1320 A
	122600 28JUL 1345 122629	10	6	VERY STIFF (2.5Y, 4/4) OLIVE BROWN SILTY CLAY, TRACE GRAVEL + GRAY MOTTLES, LOW PLASTICITY, MOIST	CL	3.0	MT: 100 BY: 0 ARC
4		13	6	STIFF (2.5Y, 2/1) BLACK, SILTY CLAY, HIGH PLASTICITY, MOIST	CL	1.75	ARC
	122630	15	2	SAA	CL	1.5	TIME 1345 ARC
5	122631 28JUL 1355 122632	10	6	SAA	CL	1.5	MT: 0 BY: 80 ARC
		11	6	SAA - TRACE BEIGE MOTTLES AND BRICK	CL	2.5	ARC
	122633	11	6	STIFF (2.5Y, 4/2) DARK GRAYISH BROWN, SILTY, CLAY, TRACE YELLOW MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2	TIME 1355 ARC

DRILLING FIRM: PENN DRILL
DRILLERS: BOB YOST TED ISAYS
RIG: SIMCO 4000 TR2
DESCRIPTION BASED ON MUNSELL

UNITS
MEASURED: BACKGROUND READINGS
MOISTURE: ppm MOIST 0 ppm
BY = CPM BY 80 CPM
2. = CPM 2. N/A CPM
ARC: ARCHIVE NO RECOVERY (NR)
SAME AS ABOVE (SAA)

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.0318	PROJECT NAME CRUS/PHASE II		
BORING NUMBER 11104	COORDINATES		DATE 28JUL93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 28JUL93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 28JUL93
DRILLING METHODS HOLLOW STEM AUGER SPLIT SPOON			PAGE 2 OF 4

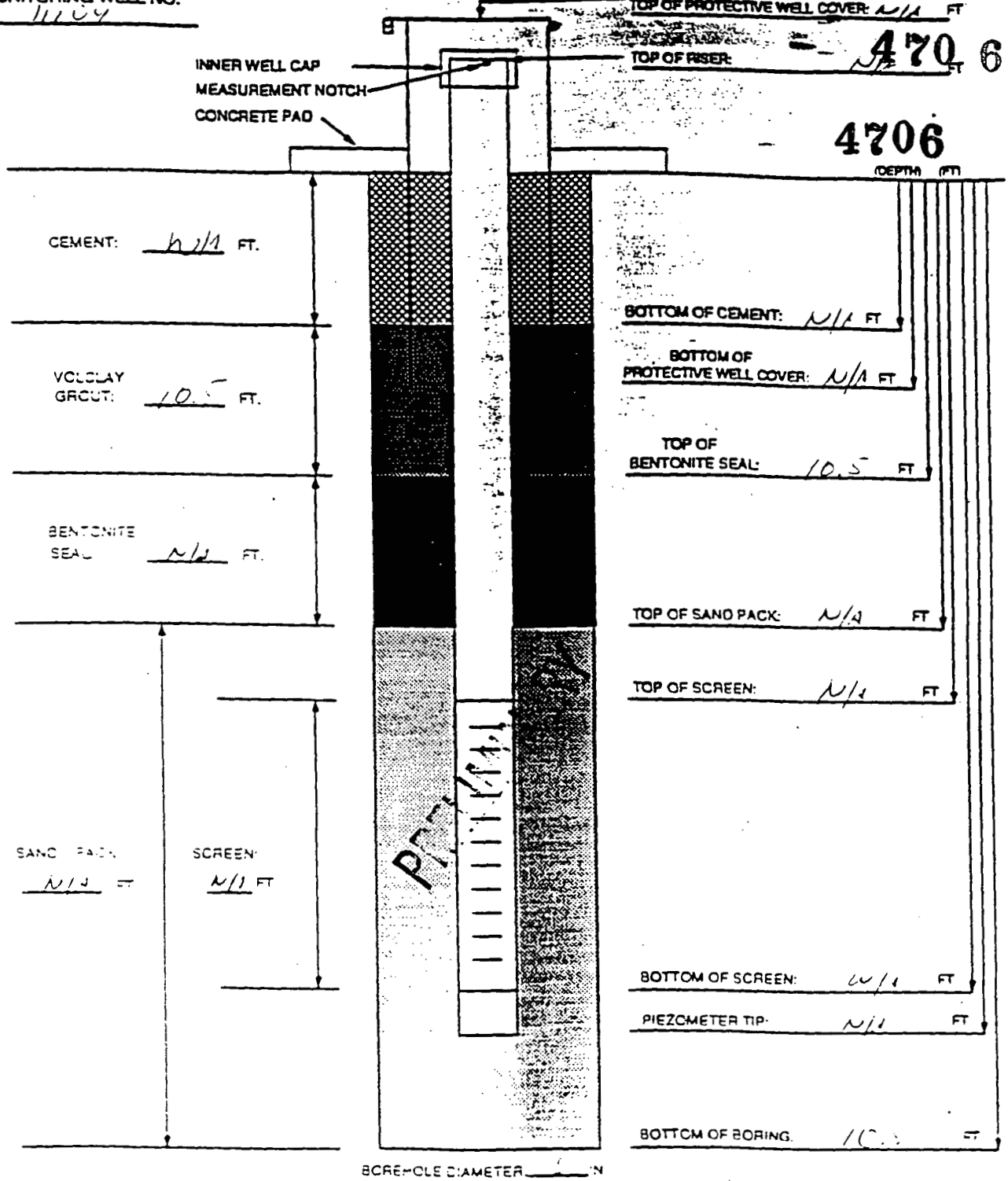
DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	122634 122635 122636	12	6	STIFF (5Y, 5/3) OLIVE SILTY CLAY, TRACE ORANGE MOTTLES AND BRICK, MEDIUM PLASTICITY, MOIST	CL	2.0	MT: ~~130~~ 0 BY: 130 28JUL93 BEM A
7	122637 28JUL 1410 122638	12	6	SAA		2.0	ARC
		13	6	SAA		2.5	TIME 1410 ARC
8	122639 28JUL 1426 122640	12	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE ORANGE MOTTLES, MEDIUM PLASTICITY MOIST	CL	2.75	MT 0 BY 50 ARC
		12	6	SAA		2.0	ARC
9	122641	12	6	SAA		1.25	TIME 1426 ARC
	122642 122643 122644	10	0/6	DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN SANDY CLAYEY SILT, TRACE ORANGE MOTTLES, VERY MOIST	ML ~~CL~~	— —	MT 0 BY 80 A
	28JUL 93	9	0/6	SAA DENSE (2.5Y, 5/4) LIGHT OLIVE BROWN, SAND, WET	SM	—	A ~~ARC~~ 30JUL93 BEM
10		12	0/0	NR	—	—	TIME 1442 ARC
	TB 122645			BOTTOM OF BORING			MT BY ARC
11							ARC
							TIME ARC

DRILLING FIRM: PENN DRILL
DRILLERS: BOB YOST, TED BAILS
RIG: SIMCO 4000 TR2
DESCRIPTION BASED ON MUNSELL

UNITS: MEASURED BACKGROUND READINGS
INSTRUMENT: MINI-RAE 0 ppm
BY 80 cpm
H/A cpm
REMARKS: NO RECOVERY - NR; SAME AS ABOVE - SAA

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
1104

INSTALLATION DATE: 28 OCT 93



BOREHOLE DIAMETER ____ IN

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (DIAMETER): N/A
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED:
DRILLER: N/A
DATE:

NOTES

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: [illegible]

RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS/PHASE II FIELD ENG./GEO. [illegible] DATE 28JUL93
PROJECT NO. 50.03.18 CHECKED BY DATE
BORING NO. 11104
PIEZOMETER NO. N/A DATE OF INSTALLATION 28JUL93

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT HOLLOW STEM AUGER
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 6	BOTTOM 10.5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP ↓	BOTTOM ↓	TOP	BOTTOM
GRAVEL	TOP ↓	BOTTOM ↓	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	10.5			
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐
REMARKS

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FERNALD RI/FS

-4700

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: 11105	COORDINATES:	DATE: 7-30-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 7-30-93	
ENGINEER/GEOLOGIST: RILEY	Depth / Date/Time	DATE COMPLETED: 7-30-93	
DRILLING METHODS: AUGER		PAGE 1 OF 4	

DEPTH (feet)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 inch)	RECOVERY (inch)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.5	122412 122413 122414 7-30-93	27	6	VERY STIFF, BROWN (10YR 5/3) CLAYEY SILT, WITH SOME MEDIUM GRAVEL, NON PLASTIC, VERY DRY	ML	3.0	MICROTIP = 0.0 ppm BG = 200 cpm
1.0	122415 7-30-93	18	6	SAA WITH SOME COAL FRAGMENTS	ML	3.0	
1.5	122416 122417 122418 7-30-93	19	6	DENSE, BROWN (10YR 5/3) WELL GRADED COARSE TO MEDIUM GRAVEL, WITH SOME SILT AND SAND, DRY	GM	NA	TIME 1010
2.0	122419 7-30-93	17	6	SAA	GM	NA	MICROTIP = 0.0 ppm BG = 100 cpm
2.5	122420 7-30-93	18	6	SAA	GM	NA	
3.0	122421 122422 122423 7-30-93	20	6	VERY STIFF, LIGHT YELLOWISH BROWN (2.5Y 6/3) SILTY CLAY, WITH SOME FINE GRAVEL AND ROOTS, MED. PLASTICITY, MOIST	CL	2.75	TIME 1024
3.5	122424 7-30-93	9	6	STIFF SAA W/ MED. GRAVEL AND WITH DARK ORGANIC MATERIAL	CL	1.5	MICROTIP = 0.0 ppm BG = 100 cpm
4.0	122425 7-30-93	8	6	SAA	CL	1.5	
4.5	122426 7-30-93	6	6	SAA	CL	1.5	TIME 1045
5.0	122427 7-30-93	6	0	NO RECOVERY	NA	NA	MICROTIP = NA ppm BG = NA cpm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : ACKER AUGER
Driller : JOE RAAB
Helper : JAMES ANDERSON

SAA = Same As Above
N/A = Not Applicable

Background = 100-
BG : 150 cpm
MT : 0.0 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5 PHASE II		
BORING NUMBER: 11105	COORDINATES:		DATE: 7-30-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7-30-93
ENGINEER/GEOLOGIST: RILEY	Depth	Date/Time	DATE COMPLETED: 7-30-93
DRILLING METHODS: Auger			PAGE 2 OF 4

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6"	RECOVERY 6"	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	122428 7-30-93	3	0	NO RECOVERY	NA	NA	SEE PREVIOUS PAGE
6.0	122429 7-30-93	6	0	NO RECOVERY	NA	NA	TIME 1100
6.5	122430 122431 122432 7-30-93	9	6	MEDIUM STIFF GRAYISH BROWN (2.5Y 5/2) SANDY CLAY, WITH TRACE OF FINE GRAVEL SLIGHTLY PLASTIC, WET	CL	1.0	MICROTIP = 0.0 PPM BG = 120 CPM
7.0	122433 ~~122434~~ ~~122435~~ 7-30-93	8	0	NO RECOVERY	NA	NA	
7.5	~~122434~~ 7-30-93 7-30-93	7	0	NO RECOVERY	NA	NA	TIME 1110
8.0	122433 7-30-93	17	6	HARD SAA WET	CL	4.25	MICROTIP = 0.0 PPM BG = 110 CPM
8.5	122434 7-30-93	35	6	HARD, GRAY (2.5Y 6/1), SILTY CLAY, WITH SOME FINE TO MOD. GRAVEL, MOD. PLASTICITY, MOIST TO WET MOTTLED W/ LIGHT OLIVE BROWN (2.5Y 5/6)	CL	4.50	
9.0	122435 7-30-93	55	6	HARD, ~~LIGHT BROWN~~ GRAY (2.5Y 6/2), SILTY CLAY WITH SOME FINE TO MOD. GRAVEL, MOD. PLASTICITY, MOIST TO WET	CL	4.50	TIME 1130
				TOTAL DEPTH 9.0 FT			MICROTIP = PPM BG = CPM

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Auger
Driller : JOE RAAB
Helper : JAMES NICHOLSON

SAA = Same As Above
N/A = Not Applicable

Background = BG = 100-150 MT - 0.0 ppm

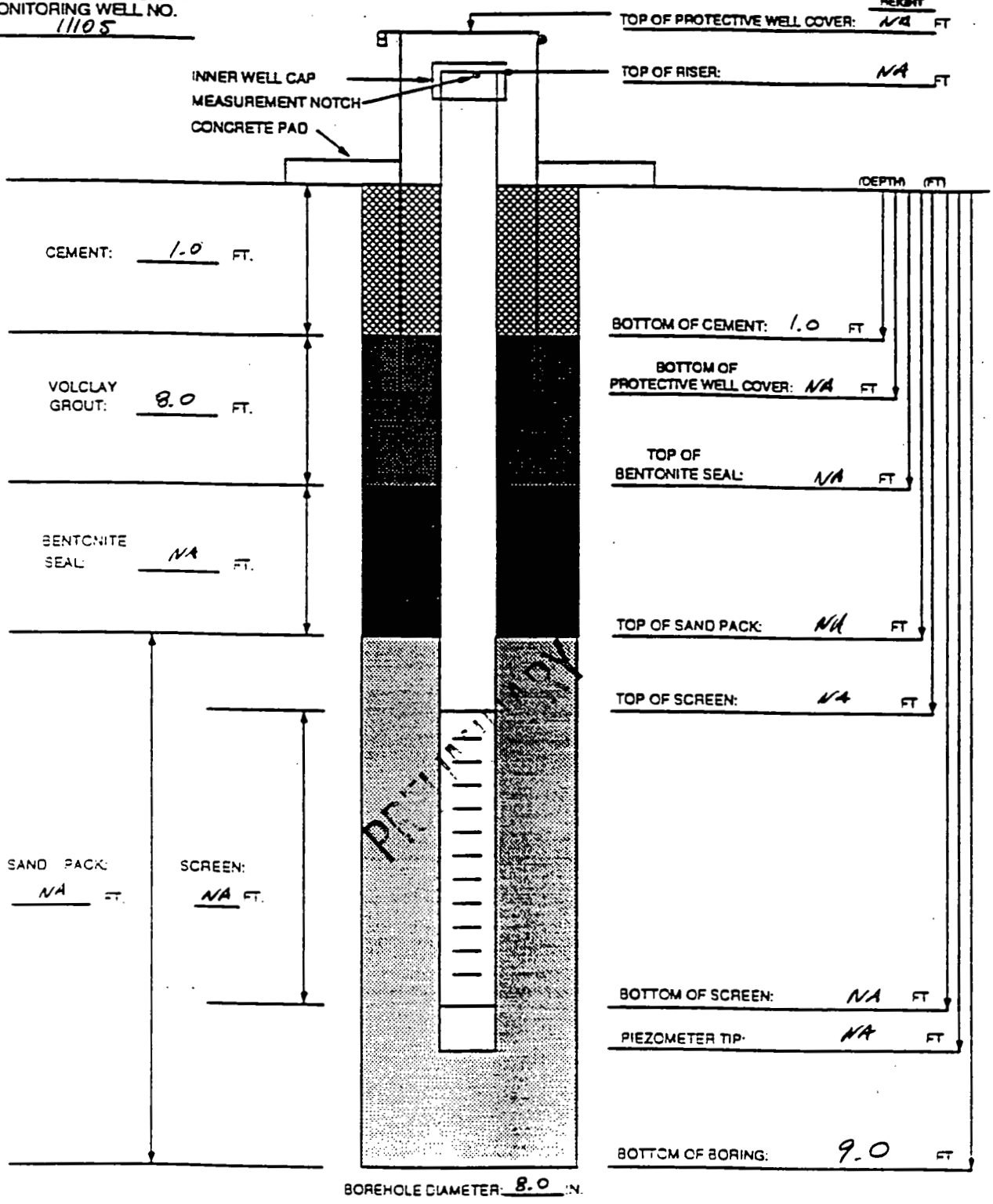
* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

122427
122423
122429
} NO RECOVERY NOT USED

4706

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11105

INSTALLATION DATE: 7-30-93



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 BAGS
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 10 GALLONS
OTHER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: RILEY

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS PHASE II
PROJECT NO. 50.03.18
BORING NO. 11105
PIEZOMETER NO. NA

FIELD ENG./GEO. RILEY DATE 7-30
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 7-30-93

BOREHOLE DRILLING

DRILLING METHOD Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Auger
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: CONCRETE	TOP 0.0	1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 9.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	9.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS NA

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. CEU-5 50.03.18		
BORING NUMBER. 11109	COORDINATES:		DATE 7-24-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-24-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-24-93
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0				dirt brown			
0.5	1014 121982 121983 121984	15	6	HARD (2.5Y, 4/3) SILTY CLAY WITH GRAVEL Cobbles mixed in, no plasticity, DRY. Some organic material, roots.	CL	4.0+	MT = 0.5 ppm Bg = 40 cpm ~~121985-A~~ OPC 7-24
1.0	1014	25	6	SAA - NO ROOTS	CL	4.0+	MT = 0.5 ppm Bg = 40 cpm 121985-A
1.5	1014 121986 121987 121988	26	6	SAA Spoon 1 ↑	CL	4.0+	MT = 0.5 ppm Bg = 40 cpm
2.0	1021	11	6	HARD (2.5Y, 6/3) light yellowish brown silty clay, low plasticity, DRY.	CL	4.0+	MT = 0.0 ppm Bg = 50 cpm 121989-A
2.5	1021	12	6	SAA	CL	4.0+	MT = 0.0 ppm Bg = 50 cpm 121990-A
3.0	1021 121991 121992 121993	17	6	SAA Spoon 2 ↑	CL	4.0+	MT = 0.0 ppm Bg = 50 cpm
3.5	1024	5	6	HARD (5Y, 2.5/2) BLACK SILTY CLAY, low plasticity, DRY.	CL	4.0+	MT = 0.0 ppm Bg = 50 cpm 121994-A
4.0	1024	11	6	SAA	CL	4.0+	MT = 0.0 ppm Bg = 50 cpm 121995-A
4.5	1024	13	6	SAA VERY DARK GRAY Spoon 3 ↑	CL	4.0+	MT = 0.0 ppm Bg = 50 cpm 121996-A
5.0	1025	5	6	VERY STIFF (10YR, 3/1) SILTY CLAY, MEDIUM PLASTICITY, DRY	CL	2.0	MT = 0.0 ppm Bg = 50 cpm 121997-A

NOTES

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - Roger Davis

Rig - Mobile 80

SAA - Same as Above

Background MT = 0.0 ppm Bg = 40-50 cpm

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CRU-5 50.07.18	PROJECT NAME. CRU5 6-11109 · 50.07.18	
BORING NUMBER. 11109	COORDINATES:	DATE 7-24-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-24-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-24-93
DRILLING METHODS: Hollow Stem Auger		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
5.5	1050	7	6	Very STIFF (10YR,3/1) Very DARK GRAY SILTY CLAY, medium plasticity, Dry	CL	2.0	MT = 0.0 ppm Bg = 45 cpm 121998-A
6.0	1050	9	6	SAA Spoon 4 ↑	CL	2.0	MT = 0.0 ppm Bg = 45 cpm 121999-A
6.5	1055 12200 122451 122452	5	6	SAA	CL	2.0	MT = 0.0 ppm Bg = 45 cpm
7.0	1055	6	6	SAA	CL	2.0	MT = 0.0 ppm Bg = 60 cpm 122453-A
7.5	1055	10	6	SAA Spoon 5 ↑	CL	2.0	MT = 0.0 ppm Bg = 60 cpm 122454-A
8.0	1235	6	6	STIFF (2.5Y,4/3) olive brown SILTY CLAY, medium plasticity, Dry	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 122455-A
8.5	1235	5	6	MEDIUM STIFF (2.5Y,4/3) olive brown SILTY CLAY medium plasticity, Dry.	CL	1.0	MT = 0.0 ppm Bg = 50 cpm 122456-A
9.0	1235	6	6	SOFT (2.5Y,5/6) light olive brown SILTY CLAY medium plasticity, Dry, (getting closer to a silt. Spoon 6 ↑	CL	.5	MT = 0.0 ppm Bg = 50 cpm 122457-A
9.5	1243 122458 122459 122460	5	6	Very STIFF (10YR,4/3) Brown SILTY CLAY medium plasticity, Dry.	CL	2.5	MT = 0.0 ppm Bg = 40 cpm
10.0	1243	6	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 40 cpm 122461-A

NOTES

Driller - Penn Drill Contractor

Driller - Mr. Bentley

Helper - Roger Davis

Rig - Mobile 80

SAA - Same As Above

Background

MT = 0.0 pp

Bg = 40-50 cp

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CRU-5 SQ 03.18	PROJECT NAME. CRU-5	
BORING NUMBER. 11109	COORDINATES:	DATE 7-24-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-24-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-24-93
DRILLING METHODS Hollow Stem Auger		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							
10.5	1243	9	6	VERY STIFF (10YR, 4/3) Brown SILTY CLAY MEDIUM PLASTICITY, MOIST Sloon 7 ↑	CL	2.5	MT = 0.0 ppm Bg = 40 cpm 122462-A
11.0	1305	8	6	MEDIUM DENSE (2.5Y, 5/6) yellowish brown medium to coarse grained SAND, poorly graded, wet	SC	NA	MT = 0.0 ppm Bg = 60 cpm 122463-A
11.5	1304	10	6	SAA VERY STIFF (2.5Y, 4/4) DARK yellowish brown SILTY CLAY MEDIUM PLASTICITY, WET	SC CL	NA 2.5	MT = 0.0 ppm Bg = 60 cpm 122464-A
12.0	1305	17	6	MEDIUM to dense (2.5Y, 5/6) yellowish brown medium to coarse GRAINED SAND, poorly graded, wet. VERY STIFF (2.5Y, 4/4) DARK yellowish brown SILTY CLAY, MEDIUM PLASTICITY, WET. Sloon 8 ↑	SC CL	NA 2.5	MT = 0.0 ppm Bg = 60 cpm 122465-A
				Total Depth - 12.0 ft.			MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES

Driller - Penn Drill Contractor

Driller - M. Bentley

Helper - Roger Davis

Rig - Mobile 80

Background.

MT = 0.0 pp

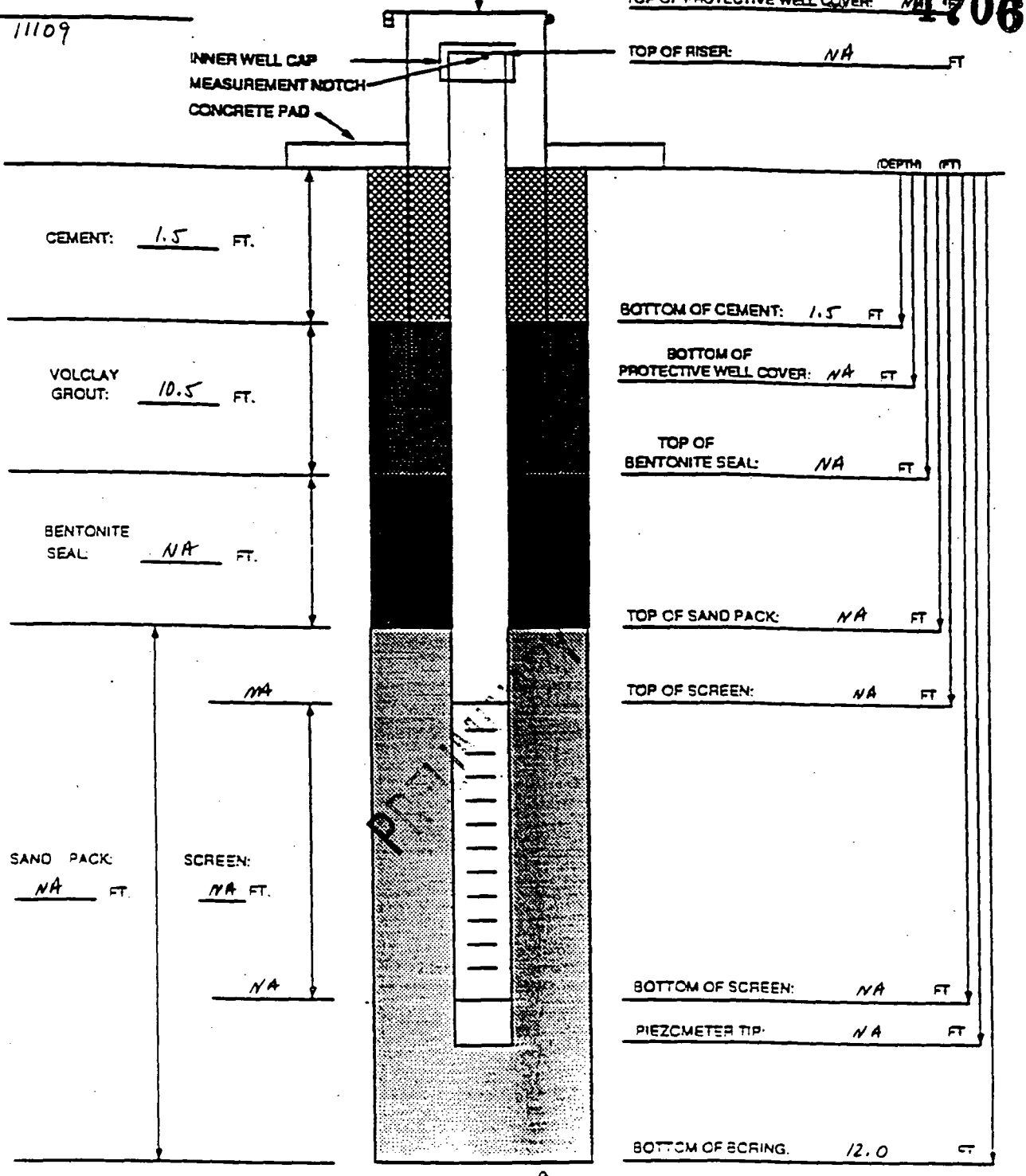
Bg = 40-50 cp

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11109

INSTALLATION DATE: 7-24-93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 20 gal
OTHER: NA
CASING: NA

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE NA — NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: O. Costello

FORM 1167 REV. 1

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU-5
PROJECT NO. 50.03.18
BORING NO. 11109
PIEZOMETER NO. 11109

FIELD ENG./GEO. D. Costello DATE 7-24-
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 7-24-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 4 1/4 in ID
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT / SLURRY	TOP 0.0	BOTTOM 1.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	12.0			
SWL AFTER INSTALLATION	NA			

N/A

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NA ☐ NO ☐
REMARKS _____

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18 | PROJECT NAME CRUS/PHASE II
BORING NUMBER 1111 | COORDINATES
ELEVATION | GWL. Depth Date/Time | DATE 25JUL93
ENGINEER-GEOLOGIST B. E. MULLER | Depth Date/Time | DATE STARTED 25JUL93
DRILLING METHODS HOLLOW STEM AUGER - CONTINUOUS SAMPLER | DATE COMPLETED 25JUL93
PAGE 1 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	25JUL 121593 121594 121595	N/A	6	2.5 FT OF ASPHALT, CONCRETE AND ROAD BED GRAVEL. VERY STIFF (2.5Y, 4/2) DARK GRAYISH BROWN, CLAYEY, SILTY, SAND, TRACE GRAVEL, WET	Sm	3.0	MT: 0 BY: 100
1	121597		6	STIFF (2.5Y 5/2) GRAYISH BROWN SANDY CLAY, TRACE GRAVEL, MOIST	CL	1.5	
	121598 121599 121597 1350		6	— (5Y, 4/2) OLIVE GRAY, SILTY SAND, TRACE GRAVEL, WET	Sm	—	
	25JUL 121600		6	VERY STIFF (5Y, 4/1) DARK GRAY, SILTY CLAY, TRACE SAND, GRAVEL, LOW - MEDIUM PLASTICITY, MOIST	CL	3.5	TIME 1350 MT: 0 BY: 100
2	122551 1350		6	SAA	CL	>4.5	
	25JUL 122552 122553 121598 1410		6	— (2.5Y, 4/1) DARK GRAY CLAYEY SILT, TRACE SAND, GRAVEL, SLIGHTLY MOIST	ML	— 3.5	
3	25JUL 122554		6	VERY STIFF (2.5Y, 4/1) DARK GRAY, ~~CLAYEY SILT~~ SILTY CLAY, TRACE SAND, GRAVEL, MOIST, MEDIUM PLASTICITY 30JUL93	CL	— 3.5	TIME 1410 MT: 0 BY: 100
	122555		6	SAA 5-6 IN COARSE SAND, WET	SC	4.0	
4	122556 1410 25JUL		6	SAA	CL	2.5	
	122557		6	SAA	CL	3.0	TIME 1410 MT: 0 BY: 100
5	122558		6	SAA	CL	4.0	
	122559 1410	N/A	6	VERY STIFF (2.5Y, 4/2) OLIVE GRAY, SILTY CLAY, TRACE SAND, MEDIUM PLASTICITY, MOIST	CL	4.0	TIME 1410

DOP
21595
21596
21586

DRILLING FIRM: PENN DRILL
DRILLER: RICH THOMAS BOB ERICKSON
RIG: MOBIL B 80
DESCRIPTIONS BASED ON MUNSELL

UNITS MEASURED FROM BOTTOM OF HOLE
BY
NO RECOVERY
SAME AS ABOVE

READINGS
0 BGM
150 CPM
N/A
212

RI/FS
4706

VISL

SSIF CATION OF SOILS

PROJECT NUMBER 50.03.
BORING NUMBER 1111
ELEVATION
ENGINEER-GEOLOGIST B.E. M
DRILLING METHODS HOLLOW

PROJECT NAME CRUS/PHASE II
COORDINATES
Depth Date/Time
Depth Date/Time
METHOD CONTINUOUS SAMPLER

DATE 25JUL93
DATE STARTED 25JUL93
DATE COMPLETED 25JUL9
PAGE 2 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	25JUL 122560 122561 121589	N/A	6	(4/2) OLIVE GRAY TRACE SAND,	ML		MT: 0 BY: 100 A
7	122562		6		ML	—	
	122563 1410 25JUL		6	F (2.5Y, 4/1) DARK GRAY Y, TRACE SAND, MEDIUM Y, MOIST	CL	3.5	ARCHIVE TIME 1410 ARCHI
8	122564		6		CL	2.75	MT: 0 BY 100 ARCHIV
	122565		6	SAA	CL	3.5	ARCHIV
9	122566 1510 25JUL		6	SAA	CL	2.5	ARCHIV TIME 1510 ARCHI
30JUL93 1BEM	122567 122568 ~~1225~~ 121590		6	SAA	CL	2.5	MT: 0 BY: 100 A
10	122569		6	SAA	CL	1.5	ARCHIVE
	122570 1510 25JUL		6	SAA	CL	1.25	TIME 1510 ARCHIVE
11	122571		6	SAA	CL	1.5	MT: 0 BY: 100 ARCHIV
	122572		6	SAA	CL	2.0	ARCHIV
	122573 1510	N/A	6	SAA	CL	2.25	TIME 1510 ARCHIVE

DRILLING FIRM: PENN DRILL
DRILLER: RICH THOMAS, BOB ERICKSON
MOISTURE BSO
(JUL 1) 1BEM ● DESCRIPTION BASED ON MUNSELL

UNITS
MEASURED
READINGS
0 PPM
BY 80 PPM
N/A
NO RECOVERY
SAME AS ABOVE

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS/PHASE II		
BORING NUMBER 11111			
ELEVATION	COORDINATES		DATE 25JUL93
ENGINEER/GEOLOGIST B.E. MULLER	GWL. Depth	Date/Time	DATE STARTED 25JUL93
DRILLING METHODS HOLLOW STEM AUGER	Depth	Date/Time	DATE COMPLETED 25JUL93
			PAGE 3 OF 5

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	25JUL 122574 122575 121591 1510	N/A	6	VERY STIFF (5Y, 4/2) OLIVE GRAY SILTY CLAY, TRACE SAND, GRAVEL, MEDIUM PLASTICITY, MOIST	CL	2.25	MT: 0 BY: 100 A
13	122576		6	VERY STIFF (5Y, 4/1) DARK GRAY SILTY CLAY, TRACE SAND, GRAVEL MEDIUM PLASTICITY, MOIST	CL	2.5	
	122577 1533		6	SAA	CL	1.5	ARCHIVE
14	25JUL 122578		6	SAA	CL	1.5	TIME 1533 ARCHI MT. 0 BY 80 ARCHI
	122579		6	SAA	CL	2.0	
	122580 1533		6	SAA	CL	2.25	ARCHI TIME 1533 ARCHI
15	25JUL 122581 122582 121592		6	SAA	CL	3.25	MT. 0 BY 80 A
16	122583		6	SAA	CL	2.5	
	122584 1533		6	SAA	CL	2.0	ARCHIVE TIME 1533 ARCHIV
17	25JUL 122585		6	(5Y, 4/1) DARK GRAY CLAYEY SILT, TRACE SAND, WET	ML	—	MT. 0 BY. 80 ARCHIV
	122586 1533	N/A	3	(2.5Y, 4/2) DARK GRAYISH BROWN, SILTY SAND, WET	SM	—	ARCHIV
				BOTTOM OF BORING			

DRILLING FIRM: PENN DRILL
DRILLER: RICH THOMAS BOB ERICKSON
RIG: MOBIL B80
DESCRIPTION BASED ON MUNSELL

UNIT MEASURED BY

NO RECOVERY
SAME AS ABOVE

PRELIMINARY

INSTALLATION/LOCATION:
MONITORING WELL NO.:

COMPLETION DATE:

TOP OF PROTECTIVE WELL COVER: FT

TOP OF RISER: N/A FT

4706

INNER WELL CAP
MEASUREMENT NOTCH
CONCRETE PAD

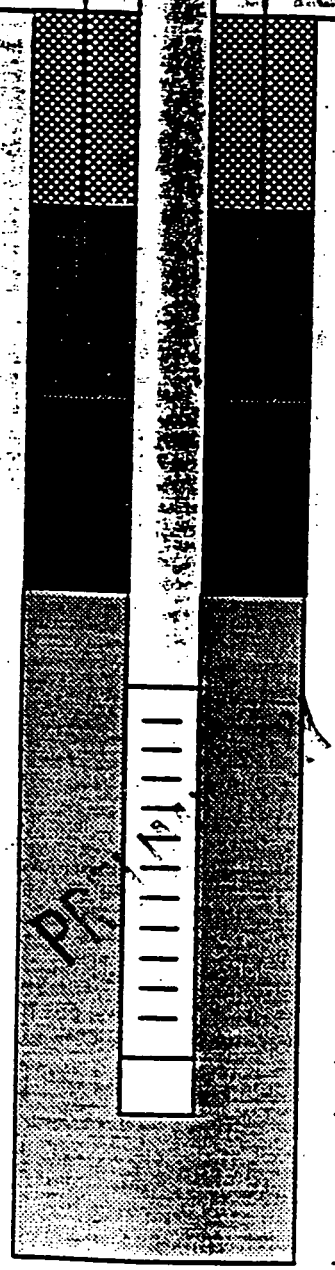
CEMENT: 1.5 FT.

VOLCLAY GROUT: 16 FT.

BENTONITE SEAL: N/A FT.

SAND PACK: N/A FT.

SCREEN: N/A FT.



(DEPTH) (FT)

BOTTOM OF CEMENT: 1.5 FT

BOTTOM OF PROTECTIVE WELL COVER: N/A FT

TOP OF BENTONITE SEAL: 13.5 FT

TOP OF SAND PACK: N/A FT

TOP OF SCREEN: N/A FT

BOTTOM OF SCREEN: N/A FT

PIEZOMETER TIP: N/A FT

BOTTOM OF BORING: 17.5 FT

BOREHOLE DIAMETER: 10 IN.

MATERIALS USED:

SAND TYPE AND QUANTITY: N/A

BENTONITE PELLETS (5-GALLON BUCKETS): N/A

VOLCLAY GROUT: 6

AMOUNT OF CEMENT: 4 Bag

AMOUNT OF WATER USED: 60 GALS

NOTES:

1) RISER PIPE IS N/A IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. I.D. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE ____ FT. ____
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: _____

FORM GIST REV. 01

215

RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CROSTPHASE II FIELD ENG/GEO: DATE
PROJECT NO. 80.03.18 CHECKED BY: DATE
BORING NO. 1111
PIEZOMETER NO. N/A DATE OF INSTALLATION

4706

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
TYPE OF BIT HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A
RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A
OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.5	BOTTOM 12.5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	12.5			
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐
REMARKS

RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50-03-15A	PROJECT NAME: Great Miami River Bank	
BORING NUMBER: 11169	COORDINATES: —	DATE: 07-30-93
ELEVATION: —	Depth — Date/Time —	DATE STARTED: 07-30-93
ENGINEER/GEOLOGIST: Terry Karkin	Depth — Date/Time —	DATE COMPLETED: 07-30-93
DRILLING METHODS: HSA		PAGE 1 OF 1

	DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1	1.5	125114 0820 7-30	49/40/23	18	medium brown SILT, few cobbles, dry 10YR 6/4	ML	N/A	BΔ=40
2	3.0	125115 0822 7-30	10/12/10	15	SAA medium brown SAND, little silt, little gravel, poorly well sorted, moist 10YR 4/6	SP/SM	N/A	BΔ=20
3	4.5	125116 0835 7-30	12/16/14	16	SAA, some cobbles (40 mm)	SP/SM	N/A	BΔ=20
4	6.0	125117 0838 7-30	20/18/14	16	SAA medium brown, SAND, fine-coarse grained, poorly sorted, little silt, little gravel, moist 10YR 5/4	SP/SM	N/A	BΔ=20
5	7.5	125118 0844 7-30	12/12/10	18	SAA.	SP/SM	N/A	BΔ=20
3 rad. 6	9.0	125119 0855 0730	14/10/15	18	SAA	SP/SM	N/A	BΔ=40
7	10.5	125120 0900 07-30	29/44/66	18	SAA	SP/SM	N/A	BΔ=20
8	12	125121 0915 7-30	29/40/45	18	SAA, few boulders (50 mm)	SP/SM	N/A	BΔ=20
9	13	125122 0925 7-30	56/81	16	SAA	SP/SM	N/A	BΔ=20
					TD=13.0' backfill w/grout			

NOTES

125124 - gross α/β @ 7.5-9.0

125123 - full rad @ 7.5-9.0

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Greater Miami Riverbank		
BORING NUMBER: 11182	COORDINATES: N/A	DATE: 07.28.93	
ELEVATION: N/A	GWL: Depth — Date/Time —	DATE STARTED: 07.28.93	
ENGINEER/GEOLOGIST: Terry Konkin	Depth — Date/Time —	DATE COMPLETED:	
DRILLING METHODS: HSA		PAGE 1 OF 1	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.5	D5074 1030 7/28	17-22 20	18	dark brown, SILT, some sand some fine gravel, slightly moist			BΔ = 50 MT = 5.5
3.0	125075 1040 7-28	6-8 6	10	med brown, CLAY, silty, moist 10YR 3/2 (0.5 pp)			BΔ = 70 MT = 10.8
4.5	125076 1043 7-28	4/8/10	18	SAA (0.5 pp)			BΔ = 100 MT = ND
6.0 125086 125087	125077 1045 7.28	4/7/7	18	tan brown, CLAY, silty, moist 10YR 4/4 (1.25 pp)			BΔ = 100 MT = ND
7.5	125078 1305 7.28	4/5/8	18	SAA (0.25 pp)			BΔ = 60 MT = ND
9.0	125079 1310 7.28	6/8/12	18	SAA (0.25 pp) med brown, SAND, some silt, moist 10YR 4/3 well sorted	SW		BΔ = 80 MT = ND
* 125083 10.5	125080 125081 1313 125082 7.28	6/21/17	16	med brown, GRAVEL, some sand, some silt, moist 10YR 4/3 poorly sorted			BΔ = 50 MT = ND
12.0	125084 1345 7.28	47/50/mr	9	med brown, SAND, fine-coarse poorly sorted, some gravel, some boulders (40 mm) moist 10YR 4/3			BΔ = 80 MT = 8.4
13.5	125085 1350 7.28	41/47	9	SAA			BΔ = 70 MT = 20
				TD = 13.0' backfill hole w/grout			

NOTES

9-10.5 - rinsate ✓
4.5-6.0 - full rad.

RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50-03154	PROJECT NAME: Greater Miami River Bank		
BORING NUMBER: 11175	COORDINATES: —	DATE: 7.29.93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED 7-29-93	
ENGINEER/GEOLOGIST: Terry Konkin	Depth — Date/Time —	DATE COMPLETED: 7-29-9	
DRILLING METHODS: 1454		PAGE 1 OF 1	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
3 1.5	125088 0910 7.29	7/7/9	18	dark brown SILT some fine sand, slightly moist. 10YR 4/3			BJ = 30 mT = 12
4 3.0	125089 0914 7.29	5/7/11	18	SAA clayey toward bottom			BJ = 100 mT = 2
5 4.5	125090 0920 7.29	5/7/11	18	SAA+ med brown CLAY silty, slightly moist 10YR 4/4		1.25	BJ = 50 mT = 4
6 6.0	125091 0940 7.29	9/12/15	6	SAA		1.0	BJ = 50 mT = 19
7 7.5	125092 0950 7.29	10/12/15	9	dark brown SAND, silty, fine grained, moist. 10YR 4/3			BJ = 50 mT = 7
8 9.0	125093 1000 7.29	15/23/41	12	SAA med brown, SAND, some silt, some gravel (30 mm), poorly sorted, moist 10YR 4/3			BJ = 50 mT = 11
9 10.5	125094 1020 7.29	21/25/35	14	med brown, GRAVEL sand +, some silt, some boulders (> 7 cm) moist 10YR 4/3			BJ = 100 mT = 9
10 12.0	125095 125096 1030 7.29	47/51(2")		med brown, SAND fine-coarse with gravel, some silt, poorly sorted (< 30 mm) moist 10YR 5/4			BJ = 40 mT = 16
1 13.0	125097 1040 7.29	46/50(1")		med brown SAND fine-coarse, poorly sorted, some gravel (30 mm) moist 10YR 5/4			BJ = 50 mT = 14
				TD = 13.0' backfill w/grout			

NOTES

full vad = 9 - 10.5

duplicate = 10.5 - 12.0

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50-03-154	PROJECT NAME: Greater Miami River bank		
BORING NUMBER: 11183	COORDINATES: —	DATE: 07-29-93	
ELEVATION: —	GWL: Depth — Date/Time —	DATE STARTED: 07-29-93	
ENGINEER/GEOLOGIST: Tony Konkin	Depth — Date/Time —	DATE COMPLETED: 7-29-93	
DRILLING METHODS: HSA		PAGE 1 OF 1	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
2 / 1.5	125098 1335 7-29	8/11/14	18	dark brown SILT, some fine sand, slightly moist 10YR 3/3			BΓ = 80 MT = 16
3 / 3.0	125099 1340 7-29	16/14/17	18	dark brown CLAY, silty, some fine sand, some coarse sand, slightly moist 10YR 3/2	1.5		BΓ = 60 MT = 7
4 / 4.5	125100 1345 7-29	17/21/25	18	dark brown SILT clayey some fine sand, slightly moist 10YR 3/2			BΓ = 60 MT = 15
5 / 6.0	125101 1350 7-29	21/27/37	18	med-dark brown, CLAY, silty slightly moist 10YR 3/2	1.35		BΓ = 60 MT = 13
6 / 7.5	125102 1410 7-29	18/12/22	6	med brown, SAND, clayey some silt, moist 10YR 4/4			BΓ = 30 MT = 0.3
7 / 9.0	125103 1415 7-29	24/29/16	15	med brown SAND trace silt, fairly well sorted, moist 10YR 5/4			BΓ = 30 MT = 0.3
8 / 10.5	125104 1430 7-29	22/24/29	9	med brown, GRAVEL, w/ sand & silt. poorly sorted (40 mm) moist 10YR 5/4			BΓ = 30 MT = ND
9 / 13.0	125105 1440 7-29	12/20/16	15	med brown, SAND, silty, fine grained, fairly well sorted some coarse gravel/ boulders 10YR 4/4			BΓ = 50 MT = 0.4
10 (5.0-7 clay) 10 (cons)	125106 1445 7-29		9	med brown, SAND, fine-coarse grained, poorly sorted some gravel/boulders, moist 10YR 5/6			BΓ = 50 MT = 0.4
				TD = 13.0'			

NOTES

12 - 13.0 - dup & rinsate

0 - 1.5 - Drilled

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Fernald Miami Riverbank		
BORING NUMBER: BH 11185	COORDINATES: N/A	DATE: 7/27/93	
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED: 7/27/93	
ENGINEER/GEOLOGIST: P. Smith	Depth N/A Date/Time N/A	DATE COMPLETED:	
DRILLING METHODS: H.S.A. 3 inch I.D. S.S.		PAGE 1 OF	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
0.0	125055 1420 7/27	7/11/8	16	3 pp (10YR 3/2) Very dark grayish brown sandy SILT, loamy topsoil, moist			βγ = 0.0 micro = 0.0
1.5	125056 1425 7/27	7/12/16	18	(10YR 4/3) brown SILT, sandy moist; (10YR 6/3) pale brown gravelly SAND moist			βγ = 0.0 micro = 0.0
3.0	125057 1430 7/27	6/15/25	13	SAA; (10YR 6/3) pale brown sandy Gravel,			βγ = 30 micro = 0
4.5	125058 1438 7/27	14/32/37	14	SAA moist			βγ = 40 micro = 0.0
6.0	125059 1458 7/27	12/10/8	18	SAA; (10YR 5/3) brown coarse SAND moist			βγ = 0.0 micro = 0.0
7.5	125060 125061 1505 7/27	6/7/12	18	SAA; .75 (10YR 5/3) brown ~~sandy CLAY~~ clayey SAND moist			βγ = 0.0 micro = 0.0
Dupe							
9.0	125062 1510 7/27	15/28/46	18	(10YR 5/2) grayish-brown, coarse gravelly SAND, moist.			βγ = 0.0 micro = 0.0
10.5	125063 1515 7/27	25/28/42	18	SAA			βγ = 50 micro = 0.0
12.0	125064 1530 7/27	28/24	12	SAA			βγ = 40 micro = 0.0
13.0				T.D = 13.0			

NOTES

Final Read = 10.5 - 12.0 = 125065

001

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5		
BORING NUMBER. PA-SD-07-11200	COORDINATES.		DATE 7-25-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-25-93
ENGINEER/GEOLOGIST O. Coskello	Depth	Date/Time	DATE COMPLETED: 7-25-93
DRILLING METHODS: Hollow Stem Auger			PAGE 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	0939 122470 122471 122472	12	6	SOFT (2.5Y, 6/4) light yellowish brown SILTY CLAY NO PLASTICITY, DRY.	CL	.5	MT = 0.0 ppm Bg = 10 cpm
1.0	0939	19	6	SAA	CL	.5	MT = 0.0 ppm Bg = 10 cpm 122473-A
1.5	0939 122474 122475 122476	16	6	SAA Spoon 1 ↑	CL	.5	MT = 0.0 ppm Bg = 10 cpm
2.0	0945	12	6	STIFF (2.5Y, 5/6) light olive brown, SILTY CLAY, LOW PLASTICITY. DRY.	CL	2.5	MT = 0.0 ppm Bg = 10 cpm 122477-A
2.5	0945	9	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 10 cpm 122478-A
3.0	0945 122479 122480 122481	13	6	SAA Spoon 2 ↑	CL	2.0	MT = 0.0 ppm Bg = 10 cpm
3.5	1023	21	6	VERY STIFF (2.5Y, 5/6) light olive brown, SILTY CLAY LOW PLASTICITY, DRY	CL	3.0	MT = 0.0 ppm Bg = 10 cpm 122482-A
4.0	1023	20	6	SAA	CL	3.0	MT = 0.0 ppm Bg = 10 cpm 122483-A
4.5	1023	16	6	Dense (2.5Y, 5/6) light olive brown, CLAYEY SILT, DRY. Spoon 3 ~~opt~~ 7-25-93	ML	NA	MT = 0.0 ppm Bg = 10 cpm 122484-A
5.0	1023 122485 122486 122487	19	6	SAA Total Depth - 5.0 ft. Spoon 3 A	ML	NA	MT = 0.0 ppm Bg = 10 cpm

NOTES

Driller - Penn Drill Contractor

Driver - M. Bentley

Helper - Roger Davis

Rig Mobile 80

SAA - Same As Above

Background MT = 0.0 PP

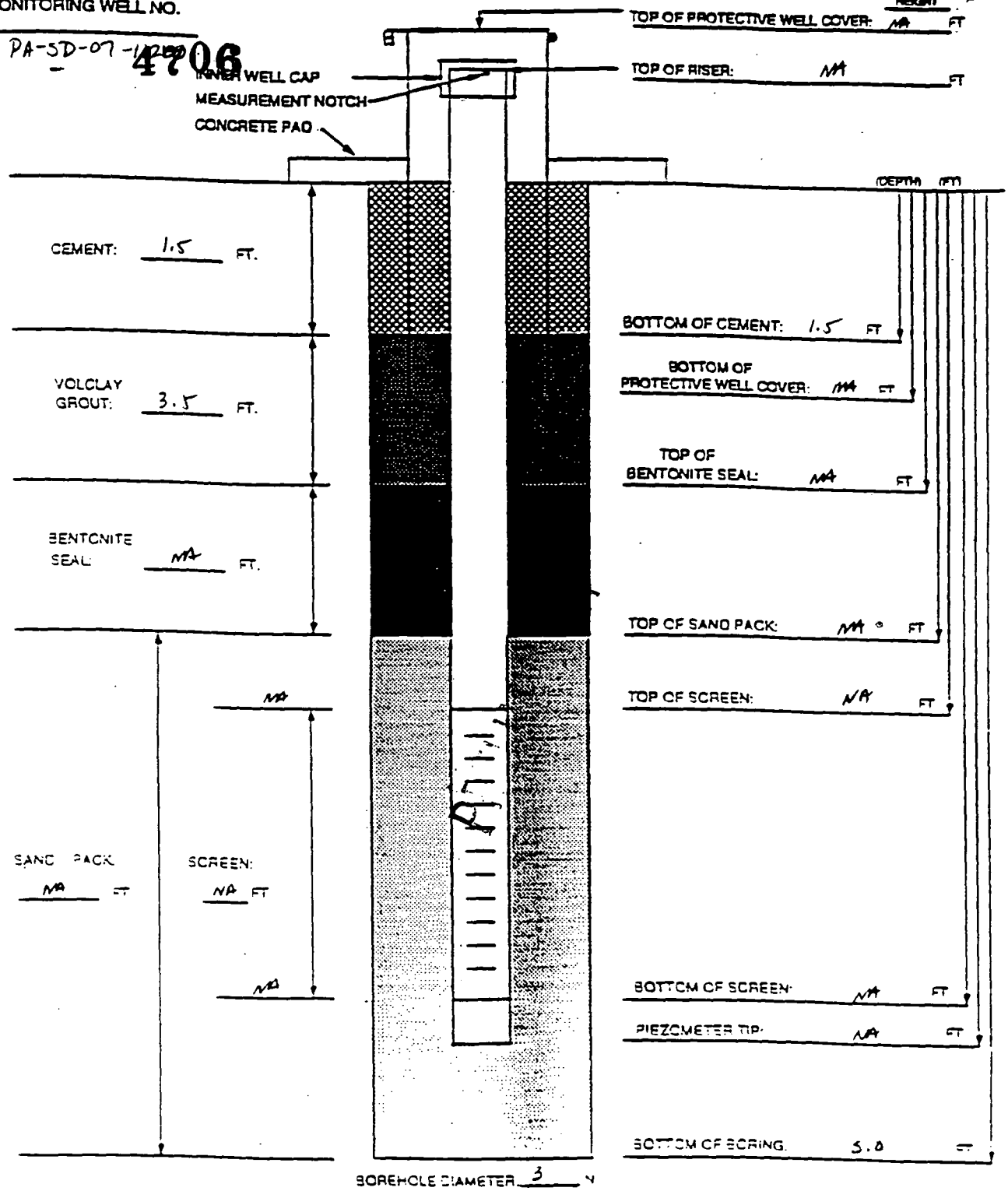
Bg = 10.0 4

PRELIMINARY

INSTALLATION DIAGRAM
MONITORING WELL NO.

PA-SD-07-1 4706

INSTALLATION DATE: 7-25-93



BOREHOLE DIAMETER 3 IN

MATERIALS USED

SAND TYPE AND QUANTITY NA
BENTONITE PELLETS (5 GALLON BUCKETS) NA
BAGS OF VOLCLAY GROUT 1
AMOUNT OF CEMENT 1
AMOUNT OF WATER USED 10
OTHER NA
NA

NOTES

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH 0.NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG.
DESIGNED BY ENGINEER O. Costello
4) WATER DEPTH AND DATE NA FT NA
5) TOP OF CASING IS SECURED W... STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH ... GROUND LEVEL
7) WELL CASING HAS A DEPTH ... COVER WITH A LOCK

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU-5
PROJECT NO. 50.03.18
BORING NO. PA-SD-07-11200
PIEZOMETER NO. PA-SD-07

FIELD ENG./GEO. O. Costello
CHECKED BY
DATE OF INSTALLATION 7-25-93

BOREHOLE DRILLING

DRILLING METHOD 3 inch split spoon
DRILLING FLUID (S) USED:
FLUID ____ FROM ____ TO ____
FLUID ____ FROM NA ____ TO ____

TYPE OF BIT ~~Hollow~~ 3 in. SPLIT SPOON
CASING SIZE (S) USED:
SIZE ____ FROM ____
SIZE ____ FROM NA ____

PIEZOMETER DESCRIPTION

TYPE
DIAMETER OF PERFORATED SECTION
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS
TOTAL PERFORATED AREA

RISER PIPE MATERIAL
RISER PIPE DIAMETERS:
O.D. NA
LENGTH OF PIPE SECTIONS
JOINING METHOD

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D.

OTHER PROTECTION

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: Cement GROUT SLURRY	0.0 TOP	1.5 BOTTOM	TOP	BOTTOM
BENTONITE	TOP	BOTTOM	TOP	BOTTOM
SAND	TOP	BOTTOM	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM	TOP NA	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP				
BOTTOM OF BOREHOLE	5.0			
WELL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WERE ANY TESTS PERFORMED ON THE PIEZOMETER? YES ☐ NO NA ☐

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Fernald Miami Riverbank		
BORING NUMBER: 11184	COORDINATES: N/A		DATE: 7/27/93
ELEVATION: N/A	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 7/27
ENGINEER/GEOLOGIST: P. Smith	Depth N/A	Date/Time N/A	DATE COMPLETED: 7/27
DRILLING METHODS: H.S.A 3 inch			PAGE 1 OF

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
1.5	125032 0748 7/27	14/20/22	16	.5pp (10YR 3/2) Very dark grayish brown Sandy SILT, loamy topsoil, few gravel, moist.	ML	N/A	Bg = 0.0 micro = 0.0
3.0	125033 0753 7/27	6/9/12	17	.5pp (10YR 3/2) SAA	ML		Bg = 0.0 micro = 0.0
4.5	125034 757 7/27	7/10/12	13	SAA	ML		Bg = 0.0 micro = 0.0
Dupe 6.0	125036 125035 0804 7/27	7/15/20	14	Stiff, (10YR 4/3) brown sandy SILT	ML		Bg = 0.0 micro = 0.0
7.5	125031 0810 7/27	6/11/17	17	Stiff .5pp, (10YR 4/2) dark grayish-brown silty CLAY, moist.	CL		Bg = 80 micro = 0.8
9.0	125036 0815 7/27	7/8/12	18	SAA	CL		Bg = 100 micro = 0.0
				Loose (10YR 3/3) brown silty SAND, moist	SM		
10.5	125034 0826 7/27	12/14/24	18	SAA	SM		Bg = 80 micro = 0.0
				(10YR 3/2) grayish brown GRAVEL	GM		
				1.0pp (10YR 3/3) brown silty CLAY moist	CL		
12.0	125040 0827 7/27	17/24/35	14	SAA	CL		Bg = 80 micro = 0
				Dense, (10YR 6/2) light brown/brownish gray, SANDY GRAVEL, dry	GM		
	125041 0835 7/27	22/15	12	SAA	GM		Bg = 80 micro = 0
				T.D = 13.0			

NOTES

Full BAD - 7 5-9.0 125042 micro 36 3.4
36 Bg 20

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Fernald - OU-5 Miami Riverbank		
BORING NUMBER: 11177	COORDINATES:	DATE: 7/26/93	
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED: 7/26/	
ENGINEER/GEOLOGIST: P. Smith	Depth N/A Date/Time N/A	DATE COMPLETED: 7/26	
DRILLING METHODS: H.S.A. 3 inch I.D. S.S.		PAGE 1 OF	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	125009 0820 7/26	23/27/26 ~~7/9/12~~ (PS)	14	med. Stiff (10 YR 4/2) dark ~~brownish~~ gray-brown sandy SILT, slightly moist	ML	N/A	βg = 0 micro = 0.0
1.5	125010 125011 0825 7/26	7/9/12	10	SAA	ML	↑	βg = 0 micro = 0.0
3.0	125012 0829 7/26	4/10/12	14	SAA ~~GRAVEL~~ (PS) loose (10 YR ~~5/3~~) ~~brown~~ ~~SAND~~ with some (PS) ~~GRAVEL~~ ~~sandy~~ dry. coarse sand.	ML GM		βg = 0 micro = 0.0
4.5	125013 0840 7/26	10/13/10	17	~~GRAA~~ SAA (4 mm bedders/cobbles) loose (10 YR 6/3) pale brown coarse to med gr SAND, dry. ~~brown~~ (PS) 7/26/93	GM SM		βg = 0 micro = 0.0
6.0	125014 0850 7/26	7/12/15	16	med. dense (10 YR 6/3) pale brown fine to med gr SAND, dry	SM		βg = 0 micro = 0.0
7.5	125015 0855 7/26	7/14/15	18	(10 YR 5/3) brown, silty SAND, fine grain to med, dry loose (10 YR 6/2) light brownish-gray SAND gravelly, dry	SM SM		βg = 0 micro = 0.0
9.0	125016 0915 7/26	10/15/24	16	SAA med. dense (10 YR 7/4) very pale brown, fine gr SAND, slightly moist.	SM SM		βg = 0 micro = 0.0
10.5	125017 0918 7/26	14/24/28	14	SAA ~~6/2~~ (PS) ~~light brown~~ (PS) dense (10 YR ~~5/2~~) ~~grayish brown~~, sandy GRAVEL, dry 10 inches	SM GM		βg = 0 micro = 0.0
12.0	125018 0933 7/26	22/29	8	SAA	GM	n/a	βg = 0 micro = 0.0
13.0				T.D = 13.0 Feet			

NOTES

0.0 - 1.5 # 125009 Full RAD
#s 125009 - 16 Total T/U.

BG βg = 20
BG micro = 19.5

RI/FS

4706 VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Fernald OU-5 G.Miami Riverbank		
BORING NUMBER: 11170	COORDINATES: NA	DATE: 7/26/93	
ELEVATION: NA	GWL: Depth NA Date/Time NA	DATE STARTED: 7/26/93	
ENGINEER/GEOLOGIST: P. Smith	Depth NA Date/Time NA	DATE COMPLETED: 7/26	
DRILLING METHODS: H.S.A. 3 inch I.D. S.S.		PAGE 1 OF	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISH)	REMARKS
1.5	125020 1030 7/26	14/23/28	18	med. stiff, (7.5 YR 3/2) dark brown, SILT, large gravel at base, dry.	ML	N/A	Bg = 0.0 micro = 0.0
3.0	125021 1040 7/26	6/7/7	13	loose, (10 YR 6/3) pale brown, gravelly SAND, dry	SM		Bg = 0 micro = 0.0
4.5	Dup 125023 Rin. 125024 125022 1047 7/26	7/8/10	16	loose (10 YR 6/2) light brownish gray coarse SAND moist @ 4.0 feet	SM		Bg = 0.0 micro = 0.0
6.0	125025 1300 7/26	6/12/14	14	SAA	SM		Bg = 0.0 micro = 0.0
7.5	125026 1310 7/26	5/7/6	18	SAA loose (10 YR 6/3) pale brown fine to med. gr. SAND moist.	SM		Bg = 0.0 micro = 0.0
9.0	125027 1318 7/26	5/8/8	19	SAA	SM		Bg = 0.0 micro = 0.0
10.5	125028 1355 7/26	9/17/24	18	SAA med. dense (10 YR 6/3) pale brown coarse sandy GRAVEL moist.	SM GM		Bg = 0.0 micro = 0.0
12.0	125029 1343 7/26	11/24/29	17	SAA med. dense (10 YR 7/3) very pale brown, sandy GRAVEL, dry	GM GM		Bg = 0.0 micro = 0.0
13.0	125030 1355 7/26	29/42	12	Dense (10 YR 6/2) light brown, sandy GRAVEL large cobbles < 6 mm, dry	GM		Bg = 0.0 micro = 0.0
				T.D. = 13.0			

NOTES

1100 Rinsate 3.0 - 4.5 S.S. 2 bottles

Equipment Blank 0.1 - 1.0 m = 125031

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Fernald		
BORING NUMBER: 11171	COORDINATES: N/A		DATE: 7-23-93
ELEVATION: N/A	GWL: Depth N/A	Date/Time N/A	DATE STARTED: 7-23-
ENGINEER/GEOLOGIST Pat Smith	Depth N/A	Date/Time N/A	DATE COMPLETED: 7/23
DRILLING METHODS: Hollow Stem Auger Rig - 3" Dia Split Spoon			PAGE 1 OF

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
(Total) 1.5	125000 1025 7/23	2/12/11	9 in	med. Stiff (7.5 YR 3/2) dark brown, SILT, dry	ML	N/A	Bg = 0.0 micro = 0.0
(Total) 3.0	125001 1030 7/23	2/15/12	11 in	med. Stiff (10 YR 5/3) brown, SILT	ML	N/A	Bg = 0.0 micro = 0
4.5	NR 1035 7/23	17/7/13	0	No Recovery	N/A	N/A	Bg = micro =
(Total) 6.0	125002 1026 7/23	10/12/13	18	S.A.A. Brown SILT	ML	N/A	Bg = 0.0 micro = 0.1
				loose, (10 YR 6/1) gray, sandy, Gravel, coarse sand, dry.	GM		
(Total) 7.5	125003 1326 7/23	4/5/8	18	S.A.A	GM	N/A	Bg = 0.1 micro = 0.0
				Very loose (10 YR 5/3) brown, coarse SAND dry	SM		
(Total)	125004 1505 7/25	22/15/10	6	SAA	SM	N/A	Bg = 0.0 micro = 0.0
(Total) 10.5	125005 1515 7/25	10/17/28	10	SAA	SM	N/A	Bg = 0.0 microfip = 0.0
(Total) 12.0	125006 1525 7/25	24/30/33	15	Dense (10 YR 4/3) brown medium to coarse SAND, dry.	SM	N/A	Bg = 0.0 micro = 0.0
				Dense (10 YR 6/2) light brownish-gray sandy GRAVEL, dry.	GM		
(Total) 13.0	125007 1535 7/25	29/27	12	Dense (10 YR 6/2) light brownish-gray, sandy GRAVEL (3-6 mm) subrounded, dry.	GM	N/A	Bg = 80cpm micro = 0.0
				T.D. = 13.0			

NOTES

* 125006 Sample # Full Rod
2 Total U/S
1 Full Rod

RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.15	PROJECT NAME: Fernald Miami Riverbank		
BORING NUMBER: 11176	COORDINATES: N/A	DATE: 7/27/93	
ELEVATION: N/A	GWL: Depth N/A Date/Time N/A	DATE STARTED: 7/27/9	
ENGINEER/GEOLOGIST: P. Smith	Depth N/A Date/Time N/A	DATE COMPLETED: 7/27	
DRILLING METHODS: H.S.A. 3 inch S.S.		PAGE 1 OF	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
1.5	125043 0947 7/27	15/24/18	18	3 pp (10YR 5/2) grayish brown clayey SILT, moist.	ML	N/A	$\beta\gamma$ = 0.0 micro = 0
3.0	125044 0952 7/27	8/11/16	18	loose (10YR 5/3) brown SILT, moist clayey	ML		$\beta\gamma$ = 0.0 micro = 0
4.5	125045 0958 7/27	10/15/14	14	1.25 pp (10YR 5/3) SAA	ML		$\beta\gamma$ = 0.0 micro = 0
6.0	R-8 Dup 125046 1005 7/27	11/18/17	18	.75 pp (SAA)	ML		$\beta\gamma$ = 0.0 micro = 0
7.5	R Dup 125047 125048 125049 1237 7/27	7/17/22	18	loose (10YR 4/4) dark yellowish brown SILT, sandy, slightly moist.	ML		$\beta\gamma$ = 0.0 micro = 0
9.0	125050 1304 7/27	10/12/24	7 (PS) 18	SAA	ML		
				med dense (10YR 6/3) pale brown SAND, fine to medium grained dry Two thin gravel layers.	SM		$\beta\gamma$ = 0.0 micro = 0.0
10.5	125051 1308 7/27	10/12/24	16	SAA, more gravel intermixed	SM		$\beta\gamma$ = 0.0 micro = 0.0
12.0	125052 1315 7/27	17/35/58	18	Dense (10YR 7/3) Very pale brown, GRAVEL sandy, dry	GM		$\beta\gamma$ = 0.0 micro = 0.0
13.0	125053 1325 7/27	51/38/40	11	SAA	GM	N/A	micro = 0.0
				T.D. = 13.0			

NOTES

1255 Remote 125048 HNO_3 preserv. (2) 3500 mL brown plastic

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~~Custody tape~~ Fax

~~Trauto~~ (PS)

~~DI water~~

Remote (PS)

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 04 37	PROJECT NAME: RCRA Phase I 23 Well		
BORING NUMBER: MW 3429	COORDINATES:	DATE: 6-10-93 6-11-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yearsley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 1 OF 19	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (tsf)	REMARKS
1.0	1600 105351 6-10-93	3 3 5	5	St. ff, 10YR(5/3) Dk. brown, organic silty clay, low plasticity, moist V. St. ff, 10YR(5/6) yellowish brown, S.H. clay, med. plasticity, moist	OL CL	1.0 2.5	βγ: 50-100 cpm Micro = 0 ppm
2.0 3.0	1603 105352 6-10-93	3 5 10	14	V. St. ff, 10YR(3/2) Vy. Dk. grayish brown, organic/wood chips, silty clay, low plasticity, dry	OL	2.5	βγ: 50-100 cpm MTip = 0 ppm
4.0	1605 105353 6-10-93	7 7 8	8	V. St. ff, 10YR(5/6) yellowish brown, silty clay, med. plasticity, moist	CL	2.5	βγ: 50-100 cpm MTip: 0 ppm
5.0 6.0	1607 105354 6-10-93	7 9 9	8	SAA	CL	2.5	βγ: 50-100 cpm MTip: 0 ppm
7.0	1610 105355 6-10-93	6 5 11	8	SAA w/ minor gravel	CL	2.0	βγ: 50-70 cpm MTip = 0 ppm
8.0 9.0	0425 105356 6-10-93	6 7 7	6	St. ff, mottled 2.5YR(5/6) & 10YR(5/6) dk. orange brown and yellowish brown, silty clay w/ minor gravel, med. plast., moist	CL	1.7	βγ: 50-70 cpm MTip = 0 ppm
10.0	0430 105357 6-10-93	7 11 13	17	V. St. ff, 10YR(5/6) yellowish brown, silty clay, w/ some gravel, med. plasticity, moist	CL	3.5 ↓ 2.0	βγ: 50-70 cpm MTip = 0 ppm
11.0 12.0	[illegible] 105358 6-10-93	6 15 19	5	Hard, mottled 7.5YR(5/6) and 10YR(5/6) strong brown and yellowish brown silty clay w/ gravel med. plasticity moist	CL	>4.0	βγ: 50-70 cpm MTip: 0 ppm
13.0	[illegible] 105359 6-10-93	17 17 23	12	V. St. ff, 10YR(5/6), yellowish brown silty clay w/ gravel (med. to coal) med. plasticity moist	CL	3.5	βγ: 50-70 cpm MTip = 0 ppm
14.0 15.0	[illegible] 105360 6-10-93	14 14 15	13	V. St. ff, mottled browns, silty clay, moist V. St. ff, 5Y(4/1) Olive Gray w/ 7.5YR(5/1) Gray, silty clay w/ gravel, moist	CL CL	3.5 3.5	βγ: 50-70 cpm MTip: 0 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: [illegible]
Helper: [illegible]

SAA = Same As Above
N/A = Not Applicable

Background = 50-90 cpm
50-70 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: WBS 04.27	PROJECT NAME: RCRA Phase I 23 Well		
BORING NUMBER: MW 3429	COORDINATES:	DATE: 6-11-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yearderly	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-27-93	
DRILLING METHODS: Cable Tool	Post Rilen 8u 5-22-93	PAGE 2 OF 19	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
16	1050 105362 6-11-93	12 13 16	17	Vy St.Ft, 2.5Y(4/1) Dk Gray w/ 7.5(5/4) Strong brown fracture coatings, silty clay, moist Vy St.Ft, 2.5Y 4/1 Dk Gray silty clay w/ gravel, med plasticity, moist	CL CL	3.5 3.5	βγ: 50-70cpm HNU: 0ppm
17 18	1410 105363 6-11-93	3 6 6	2	St.Ft, 2.5Y(4/1) Dk Gray gravelly clay, med plast moist	CL	2.0	βγ: 50-70cpm HNU: 0ppm
19 20	1415 105364 6-11-93	3 11 16	14	Very St.Ft, 2.5Y Dk Gray, silty clay w/ gravel, moist, med plasticity	CL	3.0	βγ: 50-70cpm HNU: 0ppm
21 22	1430 105365 6-11-93	4 7 11	8	Vy St.Ft, 2.5Y(4/1) Dk Gray gravelly clay, medium plasticity, moist	CL	2.25	βγ: 50-70cpm HNU: 0ppm
23	1440 ~~105366~~	4 7 13	0	No Sample	—	—	βγ: — HNU: —
24 25	1010 105368 6-15-93	5 7	18	St.Ft, 2.5Y(4/1) Dk Gray silty clay w/ gravel, moist, medium plasticity	CL	1.75	βγ: 50-70cpm HNU: 0ppm
26	1020 105377 6-15-93	3 7 [illegible]	10	SAA	CL	1.5	βγ: 50-70cpm HNU: 0ppm
27 28	105378 1025 6-15-93	4 4 5	5	St.Ft, 2.5Y(4/1) Dk Gray silty clay w/ some gravel, medium plasticity, moist	CL	1.0	βγ: 40-60cpm HNU: 0ppm
29	105370 1350 6-15-93	[illegible] 0 3	3	Vy. Soft, 2.5Y(4/1) Dk Gray, silty clay w/ some gravel, medium plasticity, wet	CL	0.5	βγ: 40-60cpm HNU: 0ppm
30 31	105371 1405 6-15-93	15 18 30	5.5	Vy St.Ft, 2.5Y(4/1) Dk Gray silty clay w/ some gravel and rock fragments, med plasticity, moist	CL	3.0	βγ: 40-60cpm HNU: 0ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Saccoy
Helper: Jeff Gorchan

SAA = Same As Above
N/A = Not Applicable
Background = [illegible]

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER WBS 04.27	PROJECT NAME: RCRA PHASE I, 23		
BORING NUMBER: MW # 3429	COORDINATES:	DATE: 6-16-93, 6	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED. 6-10-93	
ENGINEER/GEOLOGIST. RILEY, Yearnley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED. 7-26-	
DRILLING METHODS. CABLETOOL		PAGE 3 OF 19	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 INCH	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
30.0	105372 1419 6-16-93	4 5 9	12	VERY STIFF, GRAY (10YR 5/1) SILTY CLAY, WITH SOME GRAVEL, MEDIUM PLASTICITY, MOIST	CL	2.5	BY = 40-60 MicroTIP = 0 pp.
31.5	C930 105373 6-17-93	12 14 19	16	Vy. Stiff, 5Y(4/1) Dk Gray, silty clay w/ gravel, med. plasticity, moist	CL	2.0 ↓ 3.5	BY = 40-60 cpm MicroT = 0 ppm
33.0	C955 105374 6-17-93	8 9 10	17	Vy. Stiff, 5Y(4/1) Dk. Gray, silty clay w/ gravel, med. plasticity, moist	CL	2.25	BY = 40-60 cpm MTip = 0 ppm
34.5	1015 6-17-93	8 8 10	0	No Recovery	—	—	BY = NA MTip = NA
36.0	0920 105375 6-18-93	3 4 3	8	Stiff, 5Y(4/1) Dk Gray, silty clay w/ some gravel, med plasticity, moist	CL	1.5	BY = 40-60 cpm MTip = 0 ppm
37.5	0945 105376 [illegible]	5 6 31	17	Soft, 5Y(4/1) Dk Gray, silty clay, non plasticity, moist Dense [illegible] (5Y 8/1) w/ [illegible] dry Dense " [illegible] sand well sorted dry	CL ML SP	0.5 Nil	BY 40-60 cpm MTip 0 ppm
39.0				Begin 5 ft sampling			BY MTip
40.5							BY MTip
42.0							BY MTip
43.5							BY MTip
45.0							

Top of 340.00

DRILLING CONTRACTOR: PENNSYLVANIA DRILLING
EQUIPMENT: CABLE TOOL
DRILLER: JIM SACCANI
HELPER: ALEX BAKER

BACKGROUND LEVELS
6-16-93
BY: 40 cpm
MT: 0 ppm

FERNALD RI/FS

4706 VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-15-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 4 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
45.0	1015 105378 6-15-93	27 32 39	11	Vn Dense, 2.5Y(6/4) lt. yel. brown med. to crse sand w/ gravel well graded, dry	SW	NA	Bd = 40-60 cpm MT.p = 0 ppm
50.0	1020 105374 6-15-93	63 50 50	16	Vn Dense 2.5Y(6/4) yellow brown, fine sand w/ gravel, well graded, dry minor silt	SP	NA	Bd = 40-60 cpm MT.p = 0 ppm
55.0	1025 105380 6-15-93	40 32 45	12	Vn Dense, 10YR, yellowish brown, fine to medium sand w/ gravel, well graded, dry	SW	NA	Bd = 40-60 cpm MT.p = 0 ppm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Scisconi
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

PRELIMINARY

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0427	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-21-93, 6-22-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-26-93	
DRILLING METHODS: Cable Tool		PAGE 5 OF 19	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISI)	REMARKS
60	0440 105351 6-2243	32 24 34	14	V. Dense, 10YR (5/4) yellowish brown, fine sand, poorly graded, dry	SP	NA	Bg = 50-70 cpm MT.p = 0 ppm
61.5							
65.0							
	0410 105362 6-2245	48 96	13	V. Dense, 10YR (5/4) yellowish brown, fine to medium sand with fine gravel. V. Dense 10YR (5/4) yellowish brown, fine sand [illegible]	SW SP	NA	Bg = 50-70 cpm MT.p = 0 ppm
66.5							
70.0	0440 105363 6-2248	[illegible] 49 37	16	V. Dense, 10YR (5/4) yellowish brown, fine to coarse sand [illegible] gravel some large limestone [illegible] well graded [illegible]	SW	NA	Bg = 50-70 cpm MT.p 0 ppm
71.5							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Schwan
Helper : Alex Banin

SAA = Same As Above
N/A = Not Applicable
Background = [illegible]

- Samples collected per ASTM Standard Penetration Test.
- All colors identified by the Munsell Color Chart.

FERNALD
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-23-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 6 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in.	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
75.0	C850 05384 6-23-93	32 119	13	V. Dense 10YR(5/4) yellowish brown, fine to coarse sand w/ gravel, well graded, dry	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm
80.0	C915 105385 6-23-93	15 13 11	17	Med Dense 2.5Y(5/4) light olive brown medium to crse sand and gravel, well graded, wet	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm
85.0	1440 105387 6-23-93	[illegible] 15 9	8	Dense 2.5Y [illegible] olive brown med to crse sand w/ gravel well graded wet	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm

NOTES

Drilling Contractor: Pennsylvan: Drilling
Drilling Equipment : Cable Too
Driller : Jim Sc
Helper : Alex Ba

SAA = Same As Above
N/A = Not Applicable
Background = 40-50 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0427	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-23-93 6-24-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 7 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
400	1510 105388 6-23-93	10 12 18	14	Dense 2.5Y(2/4) lt olive brown, fine gravel to a coarse sand then gravel, well graded to a poorly graded gravel wet	SW ↓ GP	NA	Bg = 50-70 cpm MT.p = 0 ppm
450	0855 105389 6-24-93	27 35 32	18	v dense, 2.5Y(5/4) lt. olive brown, med. to coarse sand fine to medium gravel, well graded wet	SW	Nit	Bg = 50-70 cpm MT.p = 0 ppm
500	0935 105390 6-24-93	7 7 6	9	m. dense, 2.5Y(5/4) lt olive brown, fine to medium sand, gravel, well graded, wet	SW	NA	Bg = 50-70 cpm MT.p = 0 ppm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sczerni
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable

Background = [illegible] cpm
[illegible] ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 4206 04.27	PROJECT NAME: RCRA Phase I, 33 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-24-93, 6-25-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B Yeardley	Depth 79.4 Date/Time 7-23-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 8 OF 19	

DEPTH (FT.)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISI)	REMARKS
1050	1535 105391 62493	H 19 35	13	Dense, 2.5Y(5/4) lt. olive gray, fine to coarse sand w/ some gravel, well graded, wet	SW	NA	Bq = 60-80 cpm MT.p = 0 ppm
				hydropunch @ 1110 ft. 0910			
1100	2445 105393 62593	11 13 10	12	M. Dense, 2.5Y(5/4) lt. olive brown, fine to coarse sand w/ some gravel, well graded, wet	SW	M	Bq = 40-60 cpm MT.p = 0 ppm
1150	2546 105394 62593	45 55 30	10	V. Dense, 2.5Y(5/4) lt. olive brown, fine to coarse sand w/ fine to medium gravel, well sorted, wet	SW	M	Bq = 40-60 cpm MT.p = 0 ppm

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Sgrosini
Helper: Alex Baker

SAA = Same As Above
N/A = Not Applicable

Background = 60-80 cpm
40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0427	PROJECT NAME: RCRA Phase I, 23 well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-25-93, 6-28-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 9 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
120.0	1439	10		Medium Dense, 2.5Y(5/4) lt. olive brown, fine to medium sand, well graded, wet to a fine to crse gravel, well, wet	SW	NA	BG = 40-60 cpm
	105395	9	18				MT.p = 0 ppm
121.5	626-93	10			GW		
123.0							
	1015	28		Vy Dense, 2.5Y(5/4) lt. olive brown, fine to med. grain sand w/ gravel, well graded, wet	SW	NA	BG = 40-60 cpm
	105396	60	16				MT.p = 0 ppm
126.5	6-28-93	59					
128.0							
	1055	7		M Dense, 2.5Y(5/4) lt. olive brown, fine to med. gr sand w/ gravel well graded, wet	SW	NA	BG = 60 cpm
	105397	11	15				MT.p = 0 ppm
131.5	6-28-93	14					

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sequoi
Helper : Alex Baken

SAA = Same As Above
N/A = Not Applicable

Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

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VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0437	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 6-30-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 10 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISI)	REMARKS
136.0	1420	33		V. Dense, 2.5Y(5/4) Lt. Olive brown			Bg = 70 cpm
	105399	51	14	fine - crse sand and gravel,	SW	NA	MT.p = 0 ppm
136.5	6-30-93	59		well graded, wet			
140.0				Continuous Sampling [illegible]			
	~~105400~~ B7 7-1-93						Bg = cpm
141.5							MT.p = ppm
146.5							
	~~105301~~ B7 7-1-93						Bg = cpm
							MT.p ppm

PRELIMINARY

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Sommi
Helper: Alex Isaken

SAA = Same As Above
N/A = Not Applicable
Background = 40-60cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 04.27	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: MW 3429	COORDINATES:	DATE: 7-1-93,	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B. Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 11 OF 19	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
140 0	0720	13		M. Dense, 5Y(5/4) lt. olive brown,			βγ: 40-60 cpm
141	105400	14	16	fine to coarse sand w/ minor gravel,	SW	NA	MT.p. 0.7 ppm
	7-1-93	17		well graded, wet			(background) = fog
142	0750	6		M. dense, 2.5Y(5/4) lt. olive brown,			βγ: 40-60 cpm
	105301	8	3	fine to coarse sand w/ minor gravel,	SW	NA	MT.p: 0.3 ppm
143	7-1-93	12		well graded, wet			(background)
	1035	20		V. Dense, 2.5Y(5/4) lt. olive brown,			βγ: 40-60 cpm
144	105302	40	16	fine to coarse sand w/ gravel,	SW	NA	MT.p: 0.0 ppm
	7-1-93	52		well graded, wet			
145	1100	15		SAA			βγ: 40-60 cpm
	105303	27	14		SW	NA	MT.p: 0.0 ppm
146	7-1-93	32					
	1415	13		SAA			βγ: 40-60 cpm
147	105304	18	10		SW	NA	MT.p: 0.4 ppm
	7-1-93	28					Background: 0.4
148	1445	43		SAA			βγ: 40-60 cpm
	105305	63	11		SW	NA	MT.p: 0.0 ppm
149	7-1-93	40					
	1510	20		SAA			βγ: 40-60 cpm
150	105306	22	10		SW	NA	MT.p: 0.0 ppm
	7-1-93	26					
				Go back to 5.0 ft Sampling			βγ: MT.p:
							βγ: MT.p:
							βγ: MT.p:

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: Cable Tool
Driller: Jim Saccani
Helper: Alex Bahen

SAA = Same As Above
N/A = Not Applicable
Background = 40-60 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 0427	PROJECT NAME: RCRA Phase I, 23 Well		
BORING NUMBER: 3429	COORDINATES:	DATE: 7-8-93	
ELEVATION:	GWL: Depth 75.9 Date/Time 6-23-93	DATE STARTED: 6-10-93	
ENGINEER/GEOLOGIST: B Yeardley	Depth 79.4 Date/Time 7-26-93	DATE COMPLETED: 7-23-93	
DRILLING METHODS: Cable Tool		PAGE 12 OF 19	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in.)	RECOVERY (in.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (ISF)	REMARKS
155.0	1010 1053 7-8-93	56 71 50/0	14	Vy. Dense, 2.5Y (5/4) lt olive brown, fine to coarse gravel w/ sand, well graded, wet	GW	NA	Bg = 60-80 cpm MT.p = 0.0 ppm
156.5							
160							
	1120 1053 7-8-93	30 61 55	8	Hard, 5G (4/1) DK. greenish gray, Silty clay, high plasticity, moist w/ some gravel 7-8-93	CL		Bg = 60-50 cpm MT.p = 0.0 ppm
161.5				- Shelby Tube taken @ 161.5. No Sample - Hole drilled to 164.0 ft.			
							Bg = — cpm MT.p — ppm

PRELIMINARY

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : Cable Tool
Driller : Jim Sizemore
Helper : Alex Baker

SAA = Same As Above
N/A = Not Applicable

Background = 60-80 cpm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

MW 3429

Methodology for sand pack and sieve determination
(from R Scheper paper)

① WEMCO grain size
40% = .066 in
50% = .043 in
90% = .007 in

② 40% 90% Ratio (uniformity coefficient)
.066/.007 = 9.4 > 3 ∴ use 4 factor

③ 50% value × 4
.043 × 4 = 0.172

④ Look at distribution curves 0.172 falls beyond the medium and coarse grain curves. Therefore, because this grain size falls closer to the 50% grain size for coarse grain curve we will use coarse grain sand pack with the 20 slot (0.020 in) screen. This will allow for maximum flow of water into well and also retain formation infiltration.

Geologist: BRIAN YEARDLEY

FERNALD
RI/FS
4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME RCRA Phase I
PROJECT NO. 6427
BORING NO. 342
PIEZOMETER NO. 342

FIELD ENG./GEO. B Yeamke DATE
CHECKED BY DATE
DATE OF INSTALLATION 5-[illegible]-93 to 7-23-

BOREHOLE DRILLIN

DRILLING METHOD Cable Tool
DRILLING FLUID (S. ED:
FLUID H_2O FROM 0.0ft TO 79.0ft
FLUID — FROM — TO —

TYPE OF BIT Hammer Percussion Bit
CASING SIZE (S) USED:
SIZE [illegible] FROM [illegible] TO [illegible]
SIZE — FROM — TO —

PIEZOMETER DESCRIPTION

TYPE Monoface [illegible]
DIAMETER OF PERFORATED SECTION 4 in ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS [illegible]
TOTAL PERFORATED AREA [illegible]

RISER PIPE MATERIAL 316 Stainless Steel
RISER PIPE DIAMETERS:
O.D. [illegible] I.D. [illegible]
LENGTH OF PIPE SECTIONS
JOINING METHOD [illegible] threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0ft
PROTECTIVE PIPE O.D. [illegible]

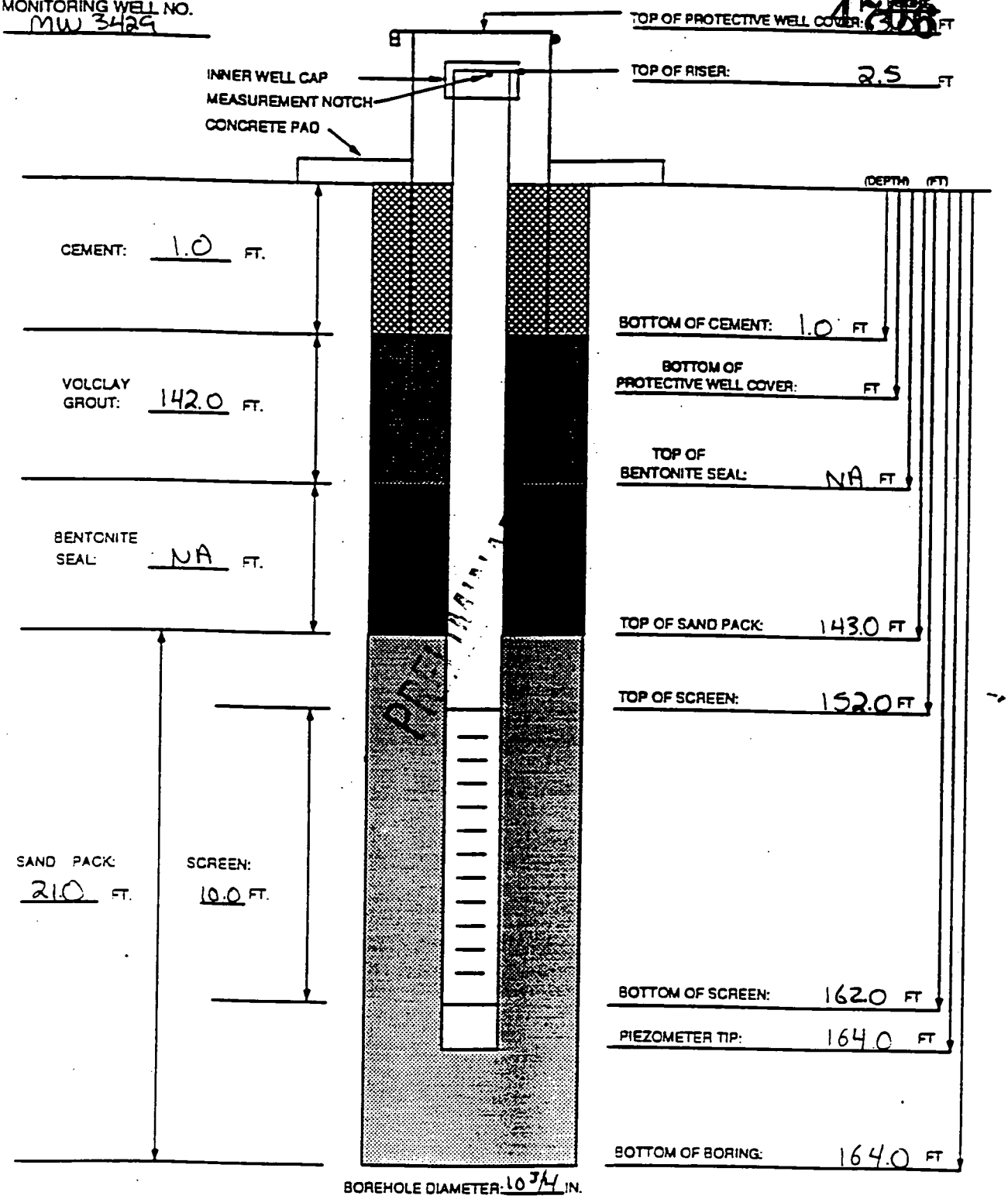
OTHER PROTECTION [illegible] cover

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	2.5			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	3.			
BOREHOLE FILL MATERIALS:				
GROUT / ~~SLURRY~~	TOP	BOTTOM [illegible]	TOP	BOTTOM
BENTONITE NA	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
SAND fine sand	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
~~GRAVEL~~ coarse sand BK 7-26-93	TOP [illegible]	BOTTOM [illegible]	TOP BK 7-26-93	BOTTOM
PERFORATED SECTION	TOP [illegible]	BOTTOM [illegible]	TOP	BOTTOM
PIEZOMETER TIP	[illegible]			
BOTTOM OF BOREHOLE	[illegible]			
GWL AFTER INSTALLATION	79.4ft			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☑
REMARKS

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. MW 3429

INSTALLATION DATE: 6-10-93 → 7-23-93



MATERIALS USED

SAND TYPE AND QUANTITY: 6 bags fine, 13 bags coarse
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 40 bags
AMOUNT OF CEMENT: 7.5 bags
AMOUNT OF WATER USED: 1240 gal
OTHER: 22 drums soil, 2 drums H_2O
TASK: 04.37

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.02 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 79.5 FT/7/26
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: B. Yocola

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ASI FORM 0157 REV. 0

VISUAL CLASSIFICATION OF SOIL 4706

PROJECT NUMBER 50.03.18	PROJECT NAME. CRUS SOIL BORING / SAMPLING		
BORING NUMBER 11199 (PA-50-06)	COORDINATES.		DATE 7/28/03
ELEVATION:	GWL: Depth NA Date/Time		DATE STARTED 7/28
ENGINEER/GEOLOGIST V. TAPPA	Depth Date/Time		DATE COMPLETED. 7/28
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	BACKGROUND / REMARKS
1	122326-122328 0900 7/28/03	13	6	(2.5Y, 5/4) sand, olive brown, med. dense, well graded, dry	SW	NA	MT = 1.0 ppm; BG = 100-150
	122329 0900 7/28/03	8	6	(2.5Y, 4/3) sandy clay, olive brown, med. plasticity, soft, moist	CL	.5	MT = 1.0-5.0 ppm
	122330-122332 0900 7/28/03	17	6	SAA	CL	2.25	BG = 100-150
2	122363 0940 7/28/03	7	6	(2.5Y, 5/2) sandy clay, gray, brown, med. plasticity, stiff, moist	CL	1.5	MT = 1.0 ppm
	122364 0940 7/28/03	8	6	SAA	CL	1.0	BG = 100-150
3	122365-122367 0940 7/28/03	11	6	(2.5Y, 5/4) sandy clay, olive brown, medium plasticity, stiff, moist	CL	1.25	
	122385 1000 7/28/03	7	6	SAA	CL	>4.5	MT = 1.0 ppm
4	122386 1000 7/28/03	18	6	SAA (with large (3-in.) gravel limestone fragments)	CL	3.5	
	122390 1000 7/28/03	27	6	SAA (with large (3 in.) gravel limestone - fragments)	CL	3.0	BG = 100-150
5	122391-122393 1000 7/28/03	38	6	SAA	CL	3.75	

Drilling Contractor [illegible]
Drilling Equipment: ACKER DRILL 2
Driller: JOE KRAMB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable

PRELIMINARY

RI/FS

P. 2 OF 3

PIEZOMETER INSTALLATION SHEET

4706

PROJECT NAME CRUS SOIL BORING/SAMPLING FIELD ENG./GEO. V. TAPPA DATE 7/
PROJECT NO. 50.03.19 CHECKED BY DATE
BORING NO. 11199
PIEZOMETER NO. NA DATE OF INSTALLATION 7/28/93

BOREHOLE DRILLING

DRILLING METHOD Hollow
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

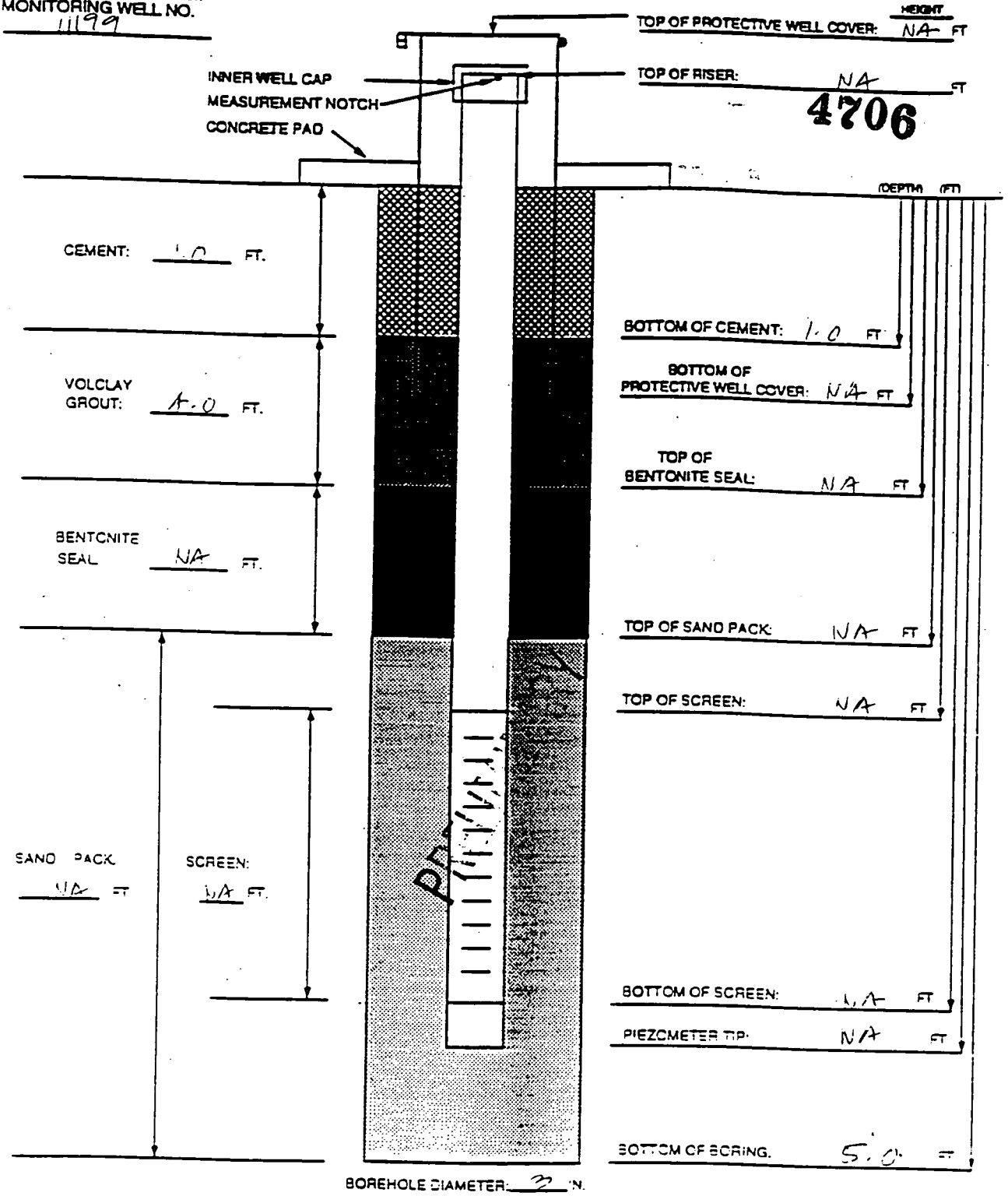
PRELIMINARY

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 FT	BOTTOM 4.0 FT	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP ↑	BOTTOM
SAND	TOP NA	BOTTOM N	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP 0.0 FT	BOTTOM 1.0 FT	TOP ↓	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	6.0 FT		NA	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A BEING TWITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11199

INSTALLATION DATE: 7/28/93



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 50 LB BAG
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: 5 GAL.
OTHER: NA
CASING: SD 26 18'

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST/ENGINEER K. TAPPA
4) WATER DEPTH AND DATE NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

50.03.18

PROJECT NUMBER ~~50.03.05~~ 7/24	PROJECT NAME. CRUS SOIL BORING/SAMPLING		
BORING NUMBER. 11109	COORDINATES.	DATE 7/24/93	
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/24/93	
ENGINEER/GEOLOGIST V. TAPPA	Depth Date/Time	DATE COMPLETED. 7/27/93	
DRILLING METHODS HOLLOW STEM AUGER/SPLIT SPOON		PAGE 1 OF 4	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	BACKGROUND / REMARKS
				2-IN. ASPHALT			MT= 1.0-1.5 ppm
1	122040-122042 1415 7-24-93	17	6	(5Y, 4/2) clay, olive gray with med. to very coarse gravel, mottling (black) - possible hydrocarbon staining, low plasticity, hard, dry	CL	>4.5	MT= 70 ppm - 90 ppm (top 4-in.) (10 ppm @ 10-18-in.)
	122043 1415 7-24-93	11	6	SAA	CL	>4.5	BG= 80-100 cpm
	122044-122046 1415 7-24-93	36	6	(2.5Y, 4/4) sandy clay with fine gravel to med. gravel, low plasticity, hard, moist, olive brown. Coarse sand & gravel (fill?), loose, dry (2.5Y, 5/4)	CL GM	>4.5 NA	
2	122047 1450 7-24-93	16	6	SAA	GM	NA	MT= 5.5 ppm
	NA 1450 7-24-93	12	0	NR	NA	NA	BG= 80-100 cpm
3	122048-122100 1450 7-24-93	14	6	(2.5Y, 5/4) coarse sand & gravel, well graded, loose, dry, lt. olive brown, POSSIBLE FILL MATERIAL	GM	NA	
	0715 7-25-93	14	6	Clay-sand-gravel mix, olive gray & black, loose, well-graded, dry	GC	NA	MT= up to 70 ppm in 6 in.
4	0715 7-25-93	19	6	(5Y, 4/2) clay, olive gray, with med. to coarse gravel, mottling, low plasticity, hard, moist	CL	>4.5	BG= 100 cpm
	0715 7-25-93	27	6	(2.5Y, 5/3) sandy clay with some fine gravel, lt. olive brown, low-med. plasticity, very stiff, moist. (2.5Y, 5/4) coarse sand & gravel, well-graded, loose (FILL)	CL GM	3.5 NA	
5	NA 0720 7-25-93	12	0	NR	NA	NA	MT= NA
	NA 0720 7-25-93	13	0	NR	NA	NA	BG= NA
	NA 0720 7-25-93	19	0	NR	NA	NA	
6	1335 7-25-93	32	0	NA	NA	NA	MT= NA
7	1335 7-25-93	17	0	NA	NA	NA	BG= NA
	1335 7-25-93	30	0	NA	NA	NA	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ACKER DRILL 2

Driller JOE RAAB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable
NR - No recovery

Samples collected per ASTM standard procedures
Colors identified using Munsell color chart

FILES
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER SD.03.18	PROJECT NAME. CRUS SOIL BORING/SAMPLING	
BORING NUMBER. 11108	COORDINATES.	DATE 7/25/93
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/24/93
ENGINEER/GEOLOGIST V. TAPPA	Depth Date/Time	DATE COMPLETED.
DRILLING METHODS HOLLOW STEM AUGER / SPLIT SPOON		PAGE 2 OF 2

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	0745 7-25-93	3	6	(5Y, 4/2) clay, olive gray, trace fine sand, med.-high plasticity, stiff, moist	CL	1.25	MT = 20 ppm (top) 0 ppm (bot)
	0745 7-25-93	6	6	(2.5Y, 4/4) sandy clay with some very fine gravel, olive brown, very stiff, low-med. plasticity, moist	CL	3.75	
9	0745 7-25-93	12	6	SAA	CL	4.5	BG = 100 cpm
	0800 7-25-93	10	6	(2.5Y, 5/4) sandy clay with trace coarse gravel, lt. olive brown, stiff, low plasticity, mottling, ~~stiff~~ fine moist	CL	1.25	MT = 3-4 ppm
10	0800 7-25-93	10	6	(2.5Y, 5/4) sandy clay with ~~some~~ silt, lt. olive brown, stiff, med. to high plasticity, wet	CL	1.0	BG = 100 cpm
	0800 7-25-93	30	6	SAA	CL	1.0	
				~~(2.5Y, 5/4) clayey sand, lt. olive brown, loose, well graded, wet~~	~~SC~~	~~NA~~	
11							MT =
							BG =
12							
13							
14							

Drilling Contractor Pennsylvania Drilling
Drilling Equipment ALLTER DRILL 2
Driller JOE RAAB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard practice
Logged in accordance with Unified Soil Classification System

RI/FS

~~P. 2 of 3~~ - P. 4 of 4 4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME ORU 5 SOIL BORING/SAMPLING FIELD ENG./GEO. K. TAPPA DATE 7/
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. 11108
PIEZOMETER NO. NA DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT _____
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

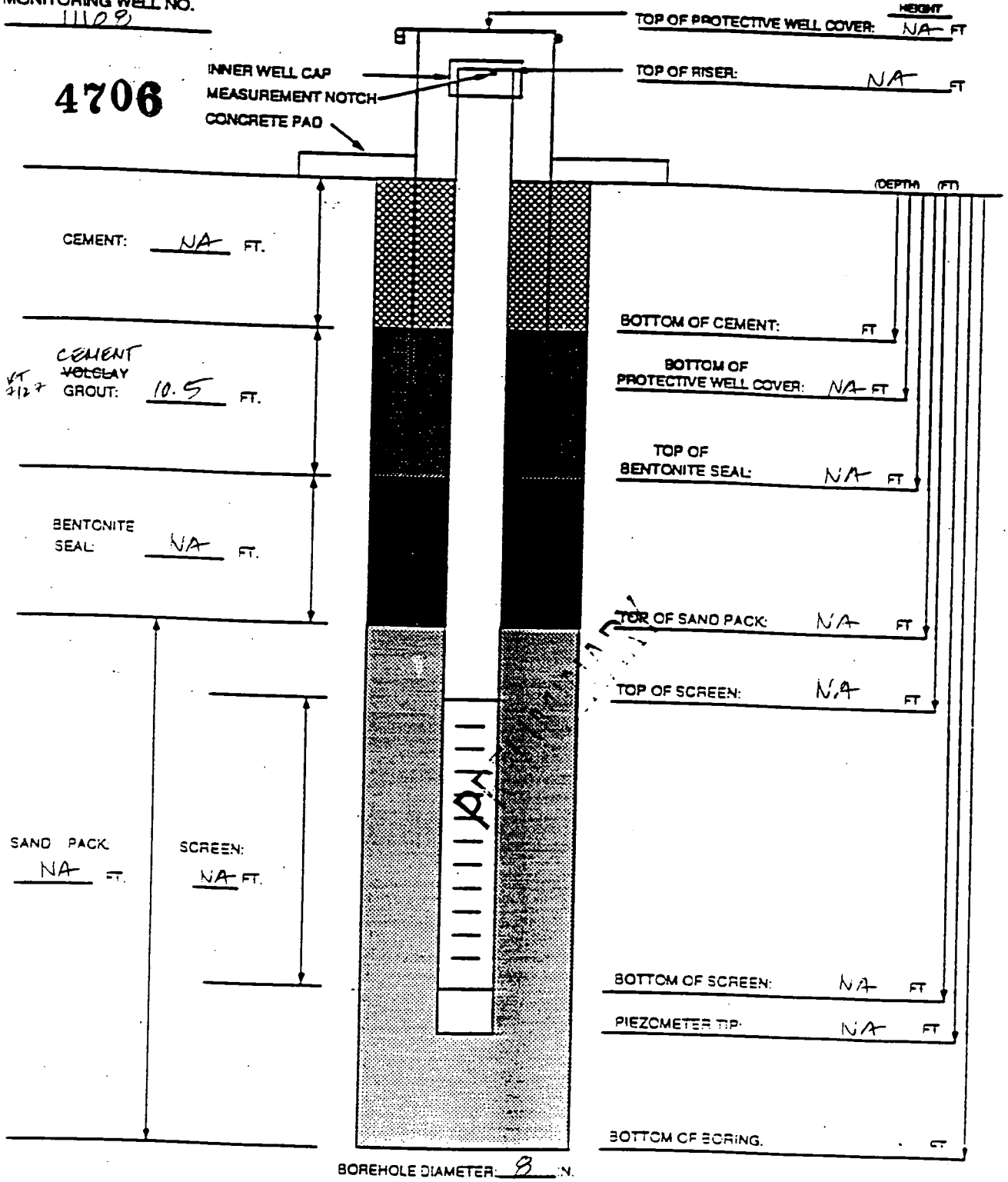
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		↕	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0 FT	BOTTOM 10.5 FT	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP ↑	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	10.5 FT		↓	
SWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS DRILLERS USED CEMENT GROUT RATHER THAN BENTONITE DUE TO HIGH TRAFFIC AREA

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11108

INSTALLATION DATE: 7/27/93

4706



BOREHOLE DIAMETER: 8 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF ~~VOLCLAY~~ CEMENT GROUT 2 50 LB BAGS
AMOUNT OF CEMENT NA
AMOUNT OF WATER USED: 5-GAL.
OTHER: NA
TASK SD 03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
GEOLOGIST/ENGINEER K. TAPPA
4) WATER DEPTH AND DATE NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

INFORMATION BELOW

RI/FS

PIEZOMETER INSTALLATION SHEET 4706

PROJECT NAME CRUS SOIL BORING/SAMPLING
PROJECT NO. 50.03.18
BORING NO. ~~1108~~ 1110
PIEZOMETER NO. NA

FIELD ENG./GEO. K. TAPPA DATE 7/2
CHECKED BY _____ DATE _____
DATE OF INSTALLATION ~~NA~~ 7/27/9

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT STEEL
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

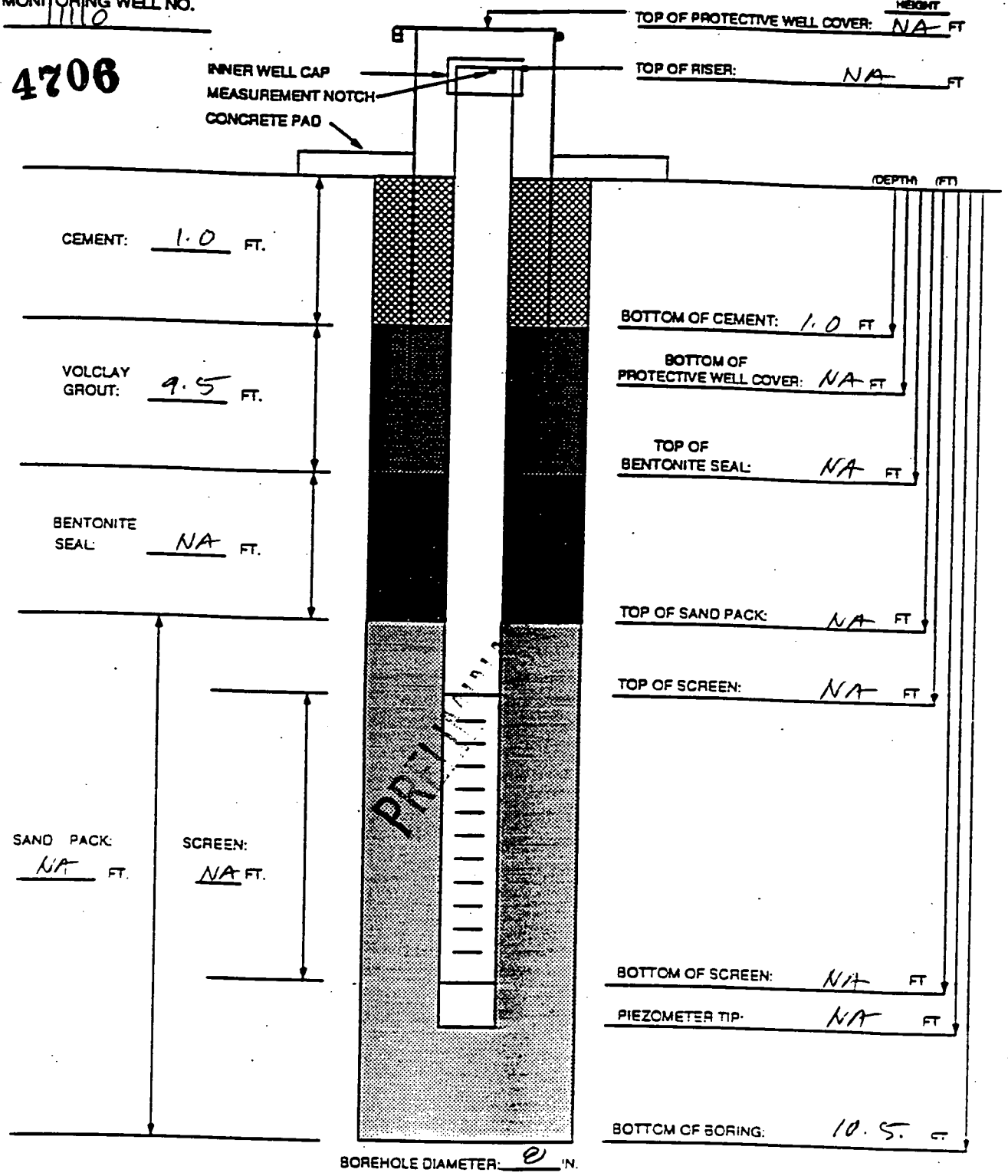
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
~~CEMENT~~ GROUT/SLURRY	TOP 0.0 FT	BOTTOM 10.5 FT	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP ~~NA~~ 0.0	BOTTOM ~~NA~~ 1.0	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP NA	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	10.5 FT		NA	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? NA YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? NA YES ☐ NO ☐
REMARKS _____

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1110

INSTALLATION DATE: 7/28/93

4706



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 50 LB BAGS
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: SMALL
OTHER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE. FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE ____ FT ____
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: K. TARPA

NSI FORM 0157 REV. 1

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03 18	PROJECT NAME. CRUS SOIL BORING & SAMPLING	
BORING NUMBER. 11195 (PA-SD-02)	COORDINATES.	DATE 7/29/93
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/29/93
ENGINEER/GEOLOGIST K. TAPPA	Depth Date/Time	DATE COMPLETED. 7/29/9
DRILLING METHODS HOLLOW STEM AUGER / SPLIT-SPOON		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6-IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	BACKGROUND / REMARKS
1	122394-122396 0905 7/29/93	30	6	(2.5Y, 5/4) sandy clay, H. olive brown, fine-coarse gravel (fill?) low plasticity, hard, dry, roots.	CL	>4.5 ~~NA~~ 7/29	MT = 0.0 ppm
	122397 0905 7/29/93	73	6	SAA	CL	>4.5 NA 7/29	MT = 0.8 ppm
	122398-122400 0905 7/29/93	42	6	(2.5Y, 4/4) sandy clay, olive brown, fine-med-gravel, low plasticity, hard, roots (less "fill" gravel), moist	CL	>4.5	βγ = 100-130 cpm
2	122401 0930 7/29/93	10	6	(2.5Y, 5/3) sandy clay, H. olive brown, low plasticity, very stiff, moist	CL	2.75	MT = 0.0 ppm
	122402 0930 7/29/93	20	6	SAA	CL	4.5	βγ = 100-130 cpm
3	122403-122405 0930 7/29/93	40	6	(10YR, 3/3) sandy clay, dark brown, some silt, low plasticity, very stiff, moist	CL	3.25	
	122406 1010 7/29/93	3	6	SAA	CL	3.5	MT = 0.0 ppm
4	122407 1010 7/29/93	6	6	SAA	CL	2.5	
	122408 1010 7/29/93	24	6	SAA	CL	2.5	βγ = 100-130 cpm
5	122409-122411 1010 7/29/93	60	6	SAA	CL	1.75	

NOTES:

Drilling Contractor Donald Lowe Drilling

Drilling Equipment: ACKER DRILL 2

Driller: JOE RAMB

JAMES ANDERSON

SAA - Same as above

NA - Not Applicable

Samples collected for [illegible] where possible [illegible]

PRELIMINARY

PIEZOMETER INSTALLATION SHEET

47 v 6

PROJECT NAME DRUS SOIL BORING/SAMPLING
FIELD ENG./GEO. K. TAPPA DATE 7/2
PROJECT NO. 50.03.18
CHECKED BY DATE
BORING NO. 11195
PIEZOMETER NO. NA
DATE OF INSTALLATION 7/27/93

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
TYPE OF BIT NA
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA
RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA
OTHER PROTECTION NA

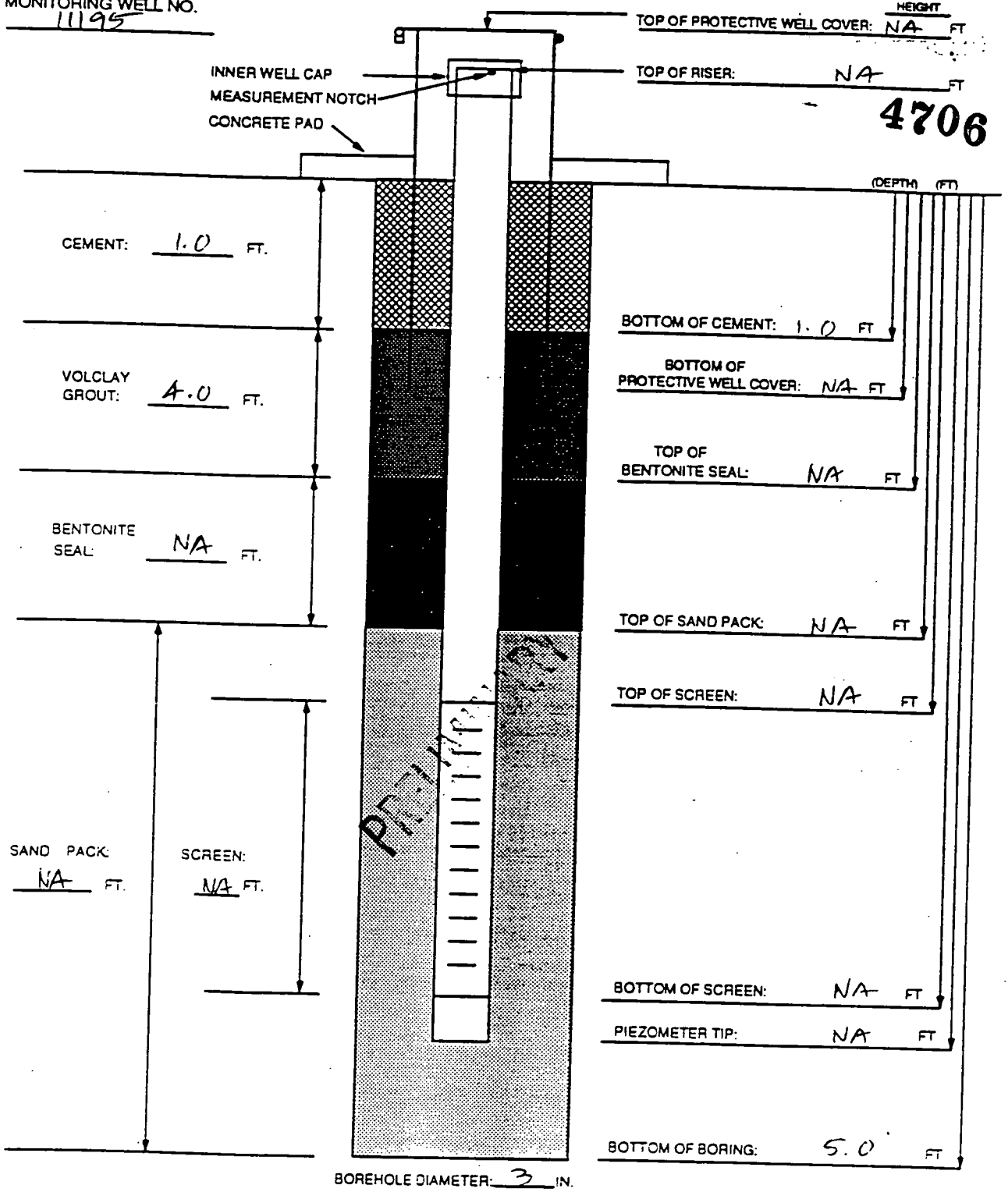
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 FT	BOTTOM 5.0 FT	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP ↑	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP 0.0 FT	BOTTOM 1.0 FT	TOP ↓	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	5.0 FT			
SWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1195

INSTALLATION DATE: 7/27/93

4706



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 50 lb bag
AMOUNT OF CEMENT: 1/2 bag
AMOUNT OF WATER USED: 5 gal
OTHER: N/A
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE N/A FT.
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. TAPPA

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER ~~20.03.05~~ 50.03.18 KT 7/27	PROJECT NAME. OU 5 SOIL BORING/SAMPLING	
BORING NUMBER. 11110	COORDINATES.	DATE 7/27/93
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/27/93
ENGINEER/GEOLOGIST K. TAPPA	Depth Date/Time	DATE COMPLETED. 7/28/93
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	BACKGROUND / REMARKS
							BACKGROUND MT= 1.0 ppm
	1250 7/27/93	16	6	(2.5Y, 4/2) Gravel with some clay, dk grayish brown, loose (surface fill) (2.5Y, 3/3, sandy clay, ~~low~~ dk. grayish brown, low plastic, very stiff, moist	CL	NA ~~TOA~~ 2.75 KT 7/27	MT= 1.0 ppm
1	1250 7/27/93	18	6	(2.5Y, 4/2) Sandy clay with some med. gravel, dark grayish brown, low-med. plasticity, hard, moist	CL	>4.5	BG= 60 cpm
	1250 7/27/93	30	6	SAA	CL	1.75	
	1325 7/27/93	17	6	(2.5Y, 3/2) Sandy clay, very dark grayish brown, low-med. plasticity, very stiff, moist, some roots	CL	3.25	MT= 1.0 ppm
2	1325 7/27/93	23	6	SAA	CL	3.0	BG= 60 cpm
3	1325 7/27/93	40	6	SAA	CL	3.0	
	1350 7/27/93	13	6	SAA	CL	2.5	MT= 2.5-3.0 ppm
4	1350 7/27/93	17	6	(2.5Y, 4/2) Sandy clay, some med. to coarse gravel, dark grayish brown, med. plasticity, very stiff, moist, mottling	CL	2.75	BG= 60 cpm
	1350 7/27/93	24	6	SAA	CL	2.5	
	1400 7/27/93	12	6	(2.5Y, 5/6) Sandy clay, lt olive brown, some sm. roots, med. plasticity, stiff, moist	CL	2.5	MT= 1.0 ppm
5	1400 7/27/93	17	6	SAA	CL	1.75	BG= 60 ppm
	1400 7/27/93	15	0	NR	NA	NA	
6	1405 7/27/93	13	6	(2.5Y, 4/4) Sandy clay, olive brown, occasional fine gravel or fine sand lens, med. plasticity, hard, moist.	CL	>4.5	MT= 1.0 ppm
7	1405 7/27/93	12	6	SAA	CL	3.5	BG= 60 cpm
	1405 7/27/93	36	6	SAA	CL	2.5	

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ALLER DRILL 2

Driller JOE ZAAB / JAMES MITCHELSON

SAA - Same as above
NA - Not Applicable
NR - No Recovery

Samples collected per ASTM standard [illegible]
Colors identified using Munsell [illegible]

PENNAMED
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME. CRUS SOIL BORING/SAMPLING	
BORING NUMBER 1110	COORDINATES.	DATE 7/27/93
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/27/93
ENGINEER/GEOLOGIST K. TAPPA	Depth Date/Time	DATE COMPLETED. 7/28/93
DRILLING METHODS HOLLOW STEM AUGER		PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
8	1AA5 7/27/93	5	6	(2.5Y, 4/2) sandy clay, mottled, dark grayish brown, med. plasticity, very stiff, moist	CL	2.5	MT = 1.0 ppm
	1AA5 7/27/93	7	6	SAA	CL	2.5	BS = 60 cpm
9	1AA5 7/27/93	11	6	(2.5Y, 5/4) sandy clay with some silt, lt. olive brown, med. - high plasticity, very stiff, moist - wet (when inch)	CL	3.0	
	1A55 7/27/93	12	6	(2.5Y, 5/4) sandy/silty clay, lt. olive brown, med. - high plasticity, stiff, some fine gravel, wet	CL	1.5	MT = 1.0 ppm
10	1A55 7/27/93	21	6	SAA	CL	2.0	BS = 60 cpm
	1A55 7/27/93	32	6	SAA	CL	4.25	
11							
12							
13							
14							

NOTES
Drilling Contractor Pennsylvania Drilling
Drilling Equipment ALLER DRILL 2
Driller JOE KAAB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable

Samples collected per ASTM standard practice before decontamination using Hornet [illegible]

PERMAPP
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~26.03.05~~ 50.03.18 KT 7/14	PROJECT NAME. CRLIS SOIL BORING/SAMPLING	
BORING NUMBER 111587 KT 7/14	COORDINATES.	DATE 7/14/93
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/14/93
ENGINEER/GEOLOGIST L. TAPPA	Depth Date/Time	DATE COMPLETED 7/14/93
DRILLING METHODS		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 6 IN.	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	BACKGROUND REMARKS
	121767 1040 7-14-93	8	6	(10YR, 4/3) Sandy clay with some coarse gravel, brown, hard, low plasticity, moist	CL	>4.5	MT = 0.0 ppm
1	NA 1040 7-14-93	18	0	NR	NA	NA	BG = 100 cpm
	NA 1040 7-14-93	9	0	NR	NA	NA	
	121768 1045 7-14-93	7	6	(2.5Y 5/4) Sandy clay with some gravel, lt. olive brown, very stiff, med. plasticity, moist	CL	3.75	MT = 0.0 ppm
2	121769-121774 1045 7-14-93	7	6	SAA	CL	2.25	BG = 100-120 cpm
	121769 1045 7-14-93	9	6	SAA	CL	1.5	
3	121770 1050 7-14-93	8	6	(2.5Y, 4/4) sandy clay with some coarse gravel, olive brown, very stiff, med. plasticity, moist	CL	2.5	MT = 0.0 ppm
	121771 1050 7-14-93	12	6	SAA	CL	.75	BG = 100-120 cpm
4	121772 1050 7-14-93	5	6	SAA	CL	.75	
	121773 1055 7-14-93	8	6	(10YR, 3/4) sandy clay with some gravel, mottling, dk. yellowish brown, stiff, med. plasticity, moist, occasional root	CL	2.0	MT = 0.0 ppm
5	121774 1055 7-14-93	9	6	SAA	CL	2.0	BG = 100-120 ppm
	121755-121758 1055 7-14-93	12	6	SAA	CL	<.25	
6							
7							

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment ACKER DRILL 2

Driller JOE RAAB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable
NR - No Recovery

Samples collected per ASTM standard procedure
Colors identified using Munsell book

FERNALD
RI/FS 06

2 OF 3

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUIS SOIL BORING/SAMPLING (K-65) FIELD ENG./GEO. K. TAPPA DATE 3/10
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. 11157
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☒
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH ~~NA~~
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 FT	BOTTOM 6.0 FT	TOP NA	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP 0.0	BOTTOM 1.0	TOP	BOTTOM
PERFORATED SECTION	TOP	BOTTOM	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	6.0 FT			
GWL AFTER INSTALLATION	NA		NA	NA

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS _____

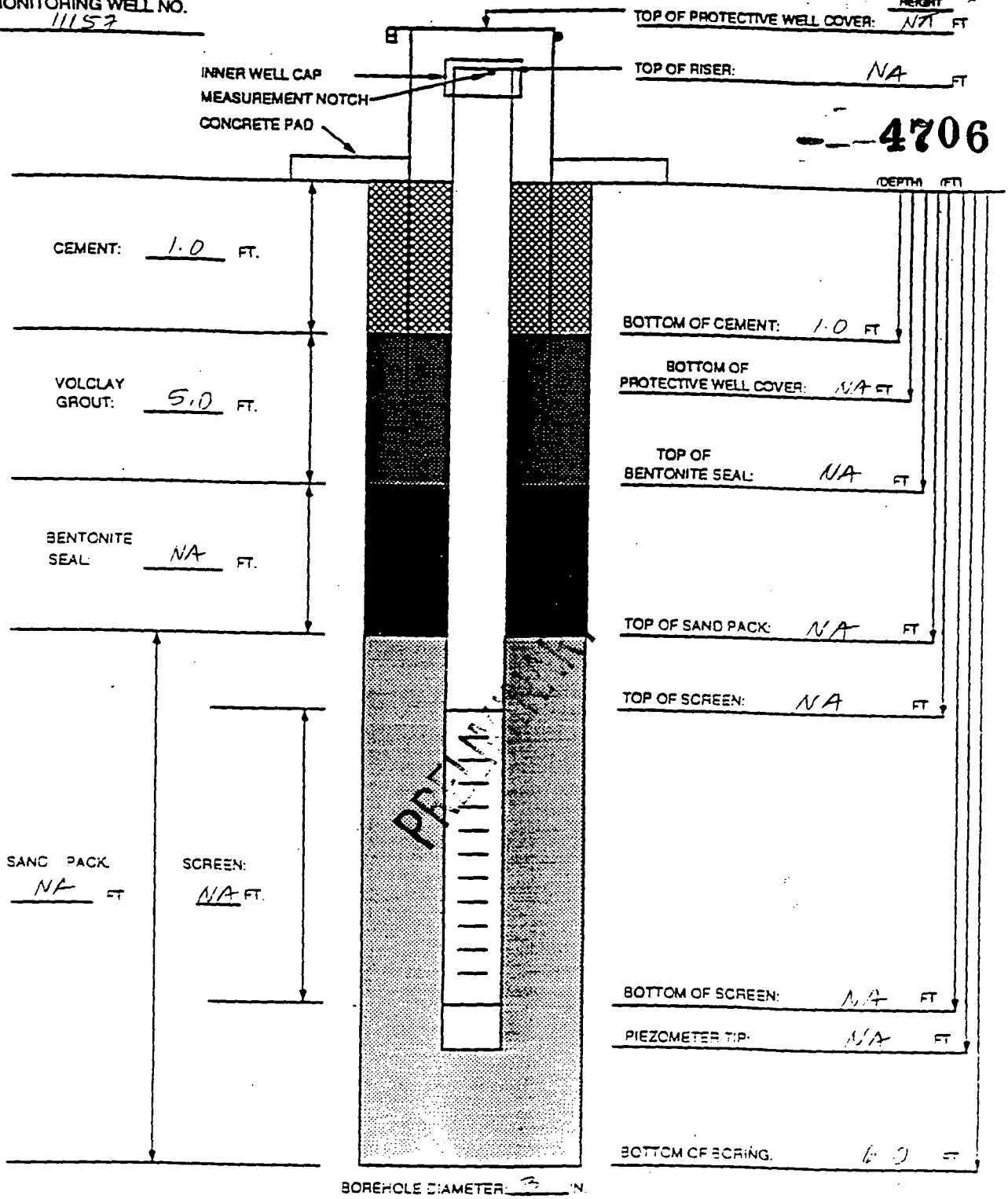
FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11157

INSTALLATION DATE: 7/14/93

TOP OF PROTECTIVE WELL COVER: HEIGHT NA FT

TOP OF RISER: NA FT

4706



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 50 LB. BAG
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED:
OTHER: NA
TASK: 50.13.18

NOTES.

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST ENGINEER: K. TAPPA

RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER ~~20.03.05~~ 50.03.18 KT 7/14	PROJECT NAME. CRUS SOIL BORING/SAMPLING	
BORING NUMBER. 11160	COORDINATES.	DATE 7/14/93
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/14/93
ENGINEER/GEOLOGIST K. TAPPA	Depth Date/Time	DATE COMPLETED. ~~7/14/93~~
DRILLING METHODS HOLLOW STEM AUGER		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	121775 0815 7-14-93	30	6	(10YR, 4/4) sandy clay with some gravel, dark yellowish brown, low plasticity, very stiff, moist	CL	2.5	MT = 0.0 ppm
1	NA 0815 7-14-93	17	0	NR	NA	NA	BG = 100-140 cpm
	NA 0815 7-14-93	12	0	NR	NA	NA	
	121776 0830 7-14-93	17	6	(10YR, 4/3) sandy clay with trace gravel, some iron mottling, brown, low plasticity, hard, moist	CL	<4.5	MT = 5.4 ppm
2	121759-121762 0830 7-14-93	21	6	SAA	CL	<4.5	BG = 100-140 cpm
	121777 0830 7-14-93	18	6	SAA	CL	<4.5	
3	121778 0840 7-14-93	18	6	(2.5Y, 4/4) sandy clay, olive brown, low plasticity, very stiff, moist	CL	3.0	MT = 0.0 ppm
	121779 0840 7-14-93	19	6	(2.5Y, 4/4) sandy clay, olive brown, low-med. plasticity, very stiff, moist	CL	3.5	BG = 100-140 cpm
4	NA 0840 7-14-93	21	0	NR	NA	NA	
	121780 0850 7-14-93	18	6	(10YR, 4/3) sandy clay with trace gravel, low-med. plasticity, brown, very stiff, moist	CL	3.5	MT = 0.0 ppm
5	121781 0850 7-14-93	20	6	(10YR, 4/4) sandy clay with trace gravel, med. plasticity, yellowish brown, very stiff, moist	CL	3.5	BG = 100-140 cpm
	121763-121766 0850 7-14-93	21	6	SAA	CL	3.0	
6							
7							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment ALLER DRILL 2
Driller JOE RAAB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable
NR - No Recovery

Samples collected per ASTM standard procedure
Colors identified using Munsell color chart

FERNALD
RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME ORUS BORING/SAMPLING K-65 FIELD ENG./GEO. K. TAPPA DATE 7/1
PROJECT NO. 50.03.18 CHECKED BY _____ DATE ____
BORING NO. 11160
PIEZOMETER NO. NA DATE OF INSTALLATION NA

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

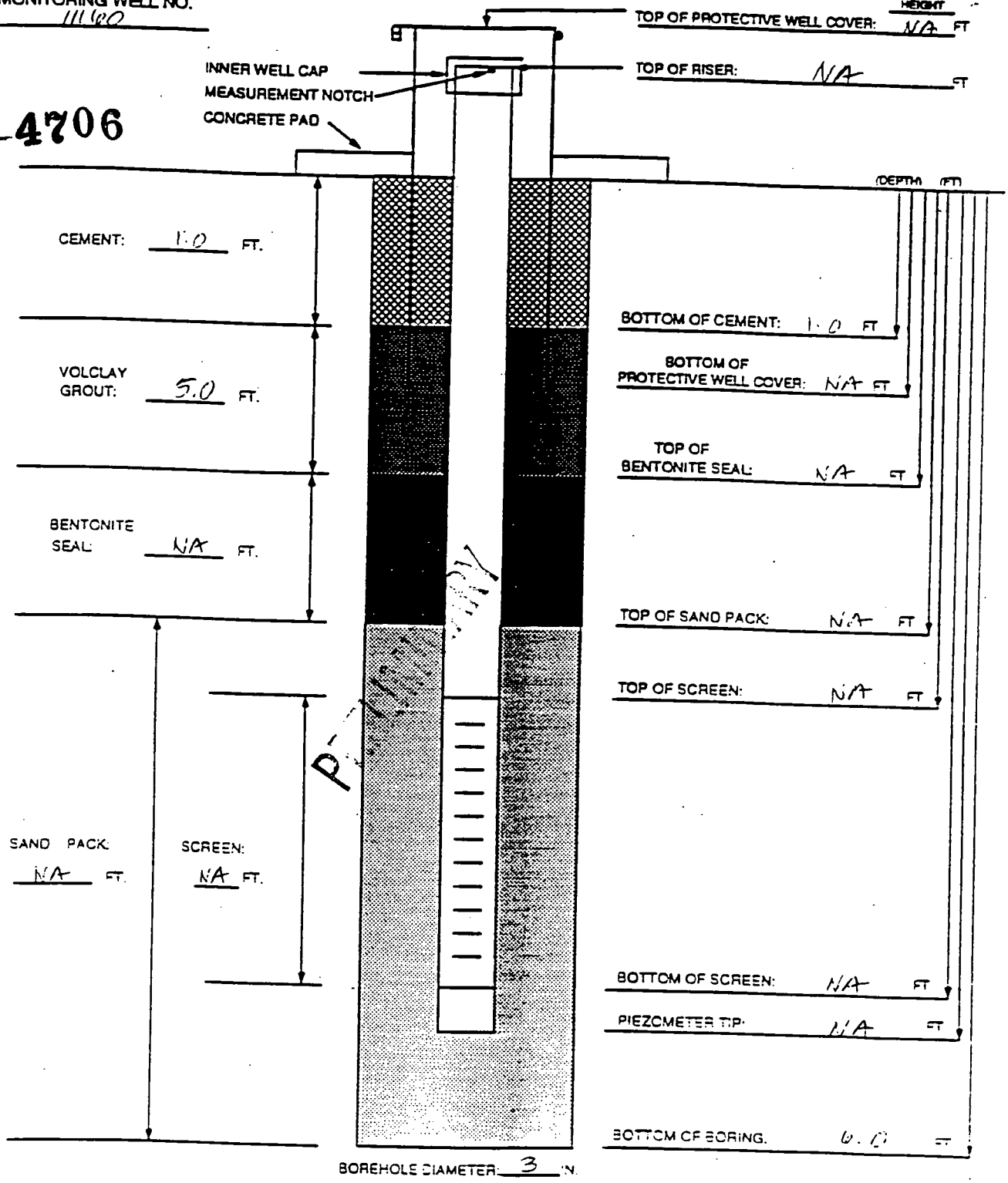
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		↕	
BOTTOM OF PROTECTIVE PIPE			NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 FT	BOTTOM 6.0 FT	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP ↑	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP 0.0 FT	BOTTOM 1.0 FT	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP ↓	BOTTOM
PIEZOMETER TIP	NA		NA	
BOTTOM OF BOREHOLE	6.0 FT		NA	
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS _____

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1180

INSTALLATION DATE: 7/14/93

4706



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 50-LB BAG
AMOUNT OF CEMENT:
AMOUNT OF WATER USED:
OTHER: NA
TASK: 50 03.18

NOTES:

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER: K. TAPPA

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 5Q03.18	PROJECT NAME: CRU 5		
BORING NUMBER: 11087	COORDINATES:	DATE: 7-14-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-14-93	
ENGINEER/GEOLOGIST: P. RILEY	Depth Date/Time	DATE COMPLETED:	
DRILLING METHODS: AUGER USING THE CME		PAGE 1 OF 5	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	121199 121200 121201 0820 7-14-93	NA	6	HARD, DARK GRAY (2.5 Y 4/1) SILTY CLAY, WITH SOME GRAVEL & ROOTLETS, MED. PLASTICITY, DRY	CL	4.5	MICROTIP = 1.0 PPM BG = 120 TO 150 CPM
0.5	121202 0820 7-14-93		6	HARD, OLIVE BROWN (2.5Y 4/4) SILTY CLAY, WITH SOME GRAVEL, MED. PLASTICITY, DRY	CL	4.5	
1.0	121203 121204 121205 0820 7-14-93		6	VERY STIFF, LIGHT OLIVE BROWN (2.5Y 5/6), SILTY CLAY, MEDIUM PLASTICITY, DRY (MOTTLED) (2.5Y 6/1) GRAY	CL	2.0	
1.5	121206 0840 7-14-93		6	SAA MOIST	CL	3.0	MICROTIP = 0.5 PPM BG = 150 CPM
2.0	121207 0840 7-14-93		6	SAA MOIST	CL	3.0	
2.5	121208 121209 121210 0840 7-14-93		6	SAA MOIST VERY STIFF, LIGHT OLIVE BROWN (2.5Y 5/6) SANDY CLAY, WITH SOME GRAVEL, MED PLASTICITY, WET	CL CL	2.5 2.5	
3.0	121211 0915 7-14-93		6	LOOSE, LIGHT OLIVE BROWN (2.5 Y 5/6) POORLY GRADED CLAYEY SAND, WITH SOME GRAVEL, WET (FINE GRAINED)	SC SC	NA	MICROTIP = 0.0 PPM BG = 120 CPM
3.5	121212 0915 7-14-93		6	SAA	SC	NA	
4.0	121213 0915 7-14-93		6	SAA	SC	NA	
4.5	121214 0930 7-14-93	NA	6	SAA	SC	NA	MICROTIP = 0.0 PPM BG = 110 CPM

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER USING THE CME
Driller : JEFF BENTLEY
Helper : MIKE LITTLETON

SAA = Same As Above
N/A = Not Applicable

Background = MICROTIP = 0.2 PPM
BG = 100 CPM

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: SD. 03. 18	PROJECT NAME:	
BORING NUMBER: B # 11097	COORDINATES:	DATE: 7-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-14-93
ENGINEER/GEOLOGIST: P. RILEY	Depth Date/Time	DATE COMPLETED:
DRILLING METHODS: AUGER USING CME		PAGE 2 OF 5

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	121215 0930 7-14-93	NA	6	SAA	SC	NA	SEE PREVIOUS PAGE
5.5	121216 0930 7-14-93		6	HARD, GRAY, (2.5 Y 5/1) SILTY CLAY WITH LIMESTONE GRAVEL, MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	4.5	
6.0	121217 121218 121219 0830 7-15-93		6	SAA TWO SPRUCE NEEDLES	CL	4.5 ~~4.5~~ PH 7/15/93	MICROTIP = 0.0 PPM BY = 100 CPM
6.5	121220 1230 ~~0830~~ PH 7/15/93 7-15-93		6	SAA LARGE ERRATIC FRAGMENTS	CL	4.5	
7.0	121221 1230 ~~0830~~ PH 7/15/93 7-15-93		6	SAA	CL	4.5	
7.5	121222 1240 7-15-93		6	SAA	CL	4.5	MICROTIP = 0.0 PPM BY = 100 CPM
8.0	121223 1240 7-15-93		6	SAA TWIG (SPRUCE?)	CL	4.5	
8.5	121224 1240 7-15-93		6	SAA	CL	4.5	
9.0	121226 121229 121230 0745 7-16-93		6	VERY STIFF SAA MOIST	CL	4.5	MICROTIP = 1.0 PPM BY = 100 CPM
9.5	121231 0745 7-16-93		6	SAA	CL	2.5	
10.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment: AUGER USING THE CME
Driller: JEFF BENTLEY
Helper: MIKE LITTLETON

SAA = Same As Above
N/A = Not Applicable

Background = MICROTIP = 0.0 PPM BY = 100 CPM

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CQU 5		
BORING NUMBER: 11087	COORDINATES:	DATE: 7-16-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 7-19-93	
ENGINEER/GEOLOGIST: RILEY	Depth / Date/Time	DATE COMPLETED: 7-16-93	
DRILLING METHODS: AUGER		PAGE 3 OF 5	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.5	12/232 0745 7-16-93		6	SAA	CL	3.5	SEE PREVIOUS PAGE
							MICROTIP = PPM Bγ = CPM
							MICROTIP = PPM Bγ = CPM
							MICROTIP = PPM Bγ = CPM

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : BOGGER
Driller : RON THOMAS
Helper : TED BEAS

SAA = Same As Above
N/A = Not Applicable

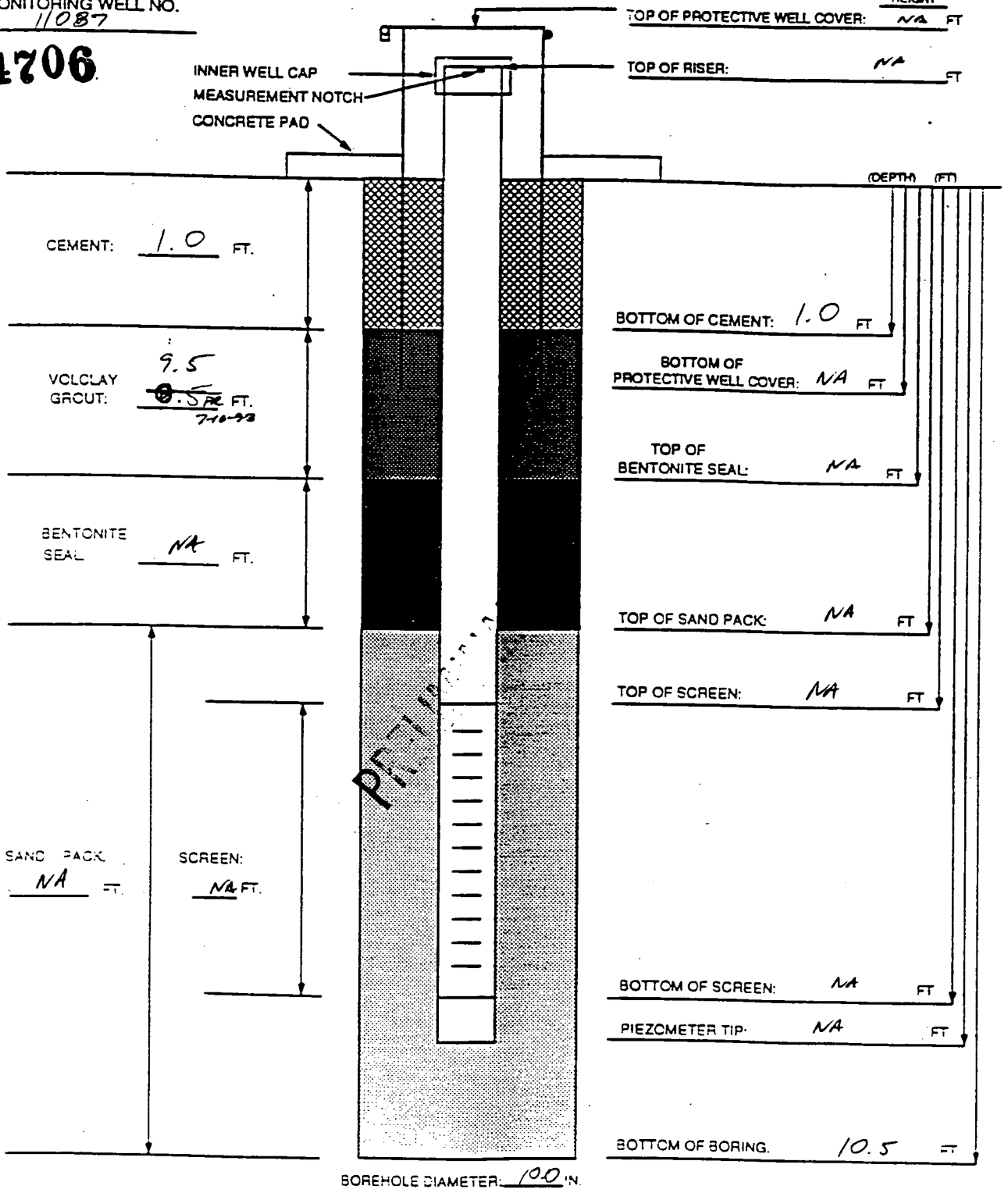
Background = 0.2 MIT
100 Bγ

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11087

4706

STALLATION DATE: 7-16-93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 4 BAGS
AMOUNT OF CEMENT: 2 BAGS
AMOUNT OF WATER USED: 10 GALLONS
OTHER: NA
TASK: 50.03.13

NOTES.

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE ____ FT ____
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: RILEY

PIEZOMETER INSTALLATION SHEET

706

PROJECT NAME CRU 5 FIELD ENG./GEO. RILEY DATE 7-16
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. B # 11087
PIEZOMETER NO. NA DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
NA ~~SLOTS~~ ☐ ~~HOLES~~ ☐ ~~SCREEN~~ ☐ PR 7-15-93
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:	TOP 0.0	1.0		
CONCRETE GROUT/SLURRY	TOP ~~0.0~~ 1.0 PR 7-16-93	BOTTOM 10.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	~~NA~~ 7-16-93 PR			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS NA

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER. CEW-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. 11097	COORDINATES.	DATE 7-13-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS Hollow Stem Auger 4¼ ID		PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	0723 121449 121450 121451	13	6	DENSE (2.5Y 4/2) DARK GRAYISH BROWN, MEDIUM GRAINED SAND WITH large gravel, cobbles, poorly graded, DRY.	SP	NA	MT = 18.0 ppm Bg = 40 cpm
1.0	0723	11	6	DENSE (2.5Y 4/2) DARK GRAYISH BROWN. MEDIUM GRAINED SAND; poorly graded, DRY	SP	NA	MT = 18.0 ppm Bg = 40 cpm 121452 - Hexane
1.5	0723 121453 121454 121455	24	0	SAM	SP	NA	MT = 19.0 ppm Bg = 40 cpm Sample ↑
2.0	0735	11	6	SAM	SP	NA	MT = 19.0 ppm Bg = 50 cpm 121456 Hexane
2.5	0735	8	6	VERY STIFF (2.5Y 3/1) DARK GRAY, SILTY CLAY, LOW PLASTICITY, DRY	CL	2.0	MT = 19.0 ppm Bg = 50 cpm 121457 - Hexane
3.0	0735 121458 121459 121460	9	6	VERY STIFF (2.5Y 4/1½) DARK GRAY BROWN, SILTY CLAY, iron staining, medium PLASTICITY, dry. Sample ↑	CL	2.5	MT = 18.0 ppm Bg = 50 cpm
3.5	0815	8	6	STIFF (2.5Y 5/4) light olive brown, silty clay, medium plasticity, DRY.	CL	1.5	MT = 0.0 ppm Bg = 60 cpm
4.0	0815	8	6	SAM	CL	1.5	MT = 0.0 ppm Bg = 50 cpm 121462 - Hexane
4.5	0815	9	6	medium dense (2.5Y 5/4) light olive brown clayey silt; moist Sample ↑	ML	1.0	MT = 0.0 ppm Bg = 60 cpm 121463 - Hexane
5.0	0857	7	6	HARD (2.5Y 5/6) light olive brown, silty clay, low plasticity, some silty laminae, dry	CL	4.5	MT = 2.0 ppm Bg = 50 cpm 121464 - Hexane

NOTES

Driller - Penn Drill Contractor

Driller - Mike Dunlay

Helper - Mike Cantwell

Rig - Mobile B61

SAM Sample Mexic

Background

MT = 0.0 ppm

Bg = 50.00 cpm

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. B 11047	COORDINATES.	DATE 7-13-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-13-93
DRILLING METHODS Hollow Stem Auger 4 1/4 ID		PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
5.5	0057	9	6	Hard (2.5Y5/6) light olive brown, silty clay low plasticity, some silty laminae, Dry	CL	4.5	MT 2.0. ppm Bg = 60 cpm 121465 - Archive
6.0	0057	12	6	SAA Spoon 41	CL	4.5	MT = 2.0 ppm Bg = 60 cpm 121466 - Archive
6.5	~~0057~~ 1152 121467 121468 ~~121469~~	7-13-93 5	6	Stiff (2.5Y, 5/4) light olive brown, silty clay medium plasticity, Dry.	CL	1.5	MT = 0.0 ppm Bg = 60 cpm
7.0	1152	6	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121470 Archive
7.5	1152	8	6	SAA Spoon 5	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121471 - Archive
8.0	1152	8	6	Very Stiff (2.5Y, 4/4) olive brown, silty clay with silt laminae, Dry	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121472 - Archive
8.5	1200	7	6	SAA	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121473 - Archive
9.0	1200 1225	9	6	SAA Spoon 6	CL	2.5	MT = 0.0 ppm Bg = 60 cpm 121474 - Archive
9.5	~~1200~~ 121475 121476 121477	7-13-93 2	6	Stiff (2.5Y, 4/4) olive brown, silty clay, medium plasticity; silty partings, moist	CL	1.5	MT = 0.0 ppm Bg = 60 cpm
10.0	1225	5	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121476 Archive

NOTES

Driller - Penn Drill
Contractor

Driller - [illegible]
Helper - [illegible]

SAA Same as Above

Background
MT = 0.0 ppm
Bg = 50 cpm

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER. CW-5 50.03.18	PROJECT NAME. 50.03.18		
BORING NUMBER. Boring 11097	COORDINATES:		DATE 7-13-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-13-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-13-
DRILLING METHODS Hollow Stem Auger 4¼ ID			PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0							
10.5	1225	9	6	MEDIUM DENSE (2.54, 5/6), olive yellow, Clayey Silt, moist. Slow ↑	ML	NA	MT = 0.0 ppm; Bg = 50 cpm; 121479-Archive
11.0	1242	5	6	MEDIUM DENSE (2.54, 4/2) dark olive gray, Clayey Silt, wet	ML	NA	MT = 0.0 ppm; Bg = 60 cpm; 121480-Archive
11.5	1242	11	6	SAA wet	ML	NA	MT = 0.0 ppm; Bg = 60 cpm; 121421-Archive
12.0	1242	10	6	SAA wet ↑ 12.0 - TOTAL DEPTH, Stop	ML	NA	MT = 0.0 ppm; Bg = 60 cpm; 121422-Archive
							MT = ppm; Bg = cpm
							MT = ppm; Bg = cpm
							MT = ppm; Bg = cpm
							MT = ppm; Bg = cpm
							MT = ppm; Bg = cpm
							MT = ppm; Bg = cpm

NOTES

Driller - Penn Drill Contractor

Driller - Mike Sutton

Helper - Mike Cimbala

Rig Mobil 80

SAA - Same as Above

Background

MT = 0.0 ppm

Bg = 50 cpm

RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME: CRU 5 SC 03.16
PROJECT NO. SC.03.16
BORING NO. 11097
PIEZOMETER NO. 11097

FIELD ENG./GEO. O. Costello
CHECKED BY
DATE OF INSTALLATION 7-14-93 (13 OPC 7-14-93)

BOREHOLE DRILLING

DRILLING METHOD Hollowstem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 4¼ inch ID auger
CASING SIZE (S) USED:
SIZE NA FROM NA
SIZE NA FROM NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS NA HOLES NA SCREEN NA
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

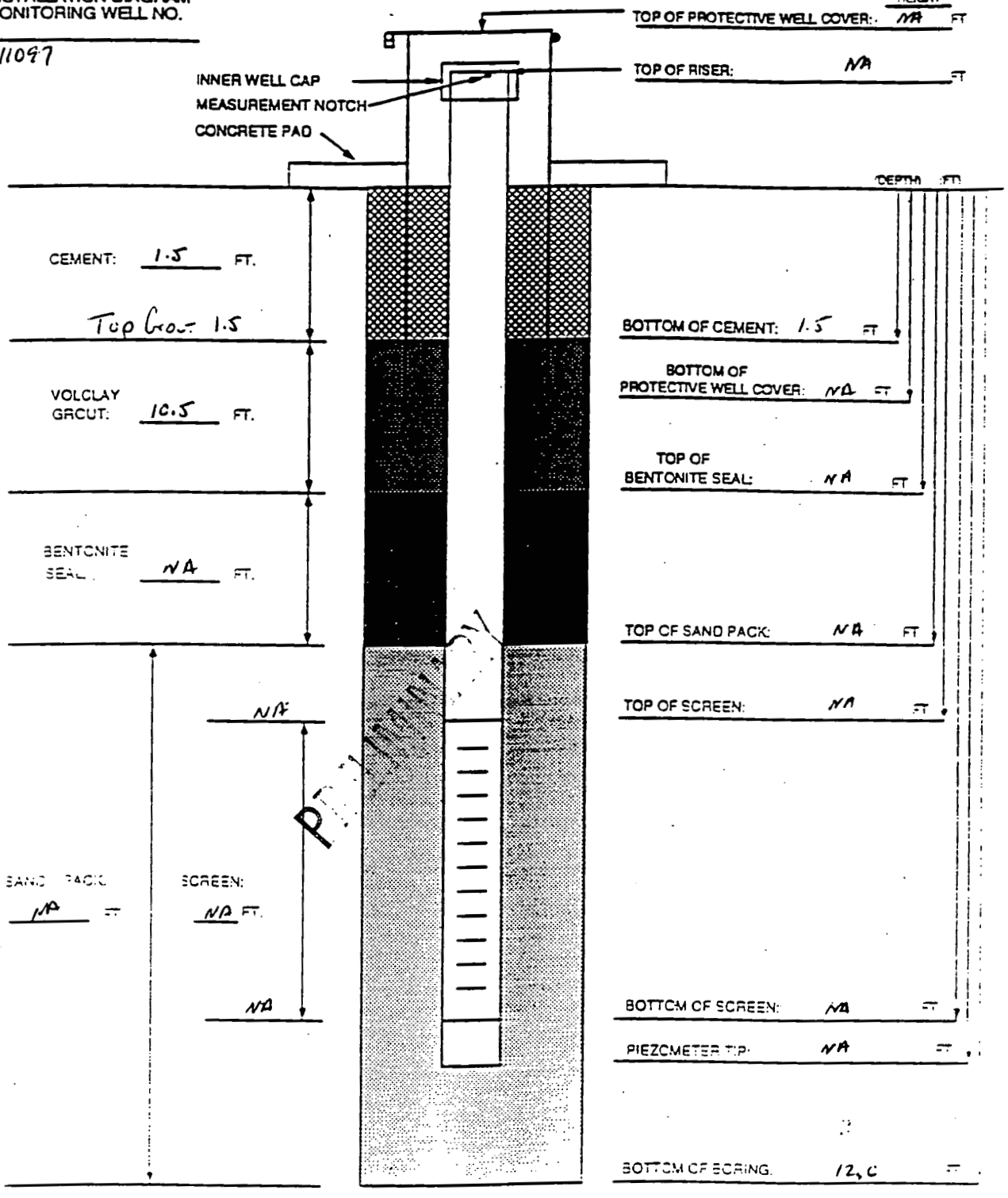
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS: Cement	0.0	1.5	
FILL SLURRY	TOP	BOTTOM NA	TOP BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP BOTTOM
SAND	TOP NA	BOTTOM NA	TOP BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP BOTTOM
PIEZOMETER TIP	NA		
BOTTOM OF BOREHOLE	12.0		
FILL AFTER INSTALLATION	NA		

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ___ NO ___
WERE ANY TEST PERFORMED ON THE PIEZOMETER? YES ___ NO ___

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

11097

INSTALLATION DATE: 7-13-93



MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (GALLON BUCKETS): NA
SAND OR VOLCLAY GROUT: 2
AMOUNT OF CEMENT: 1
AMOUNT OF WATER USED: 20 Gallons
OTHER: ____

NOTES.

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH NA IN SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
GEOLOGIST/ENGINEER: C. Cockle

4) WATER DEPTH AND DATE: NA
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESIS INDICATE BELOW GROUND LEVEL
WELL CASING HAS A PROTECTIVE COVER IN PLACE

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CEU-5 SC.03 18	PROJECT NAME. Boring 11099		
BORING NUMBER. 11099	COORDINATES. NA		DATE 7-10-93
ELEVATION: NA	GWL: Depth	Date/Time	DATE STARTED 7-10-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-11-93
DRILLING METHODS Hollow Stem Auger			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	1105 121402 121403 121404	22	6	Dense (10YR, 4/4) Dark yellowish Brown, coarse grained sand with large gravel pebbles, well graded, dry.	SW	NA	HLT = 0.0 ppm; BG = 160 cpm; ~~121401 Archive~~
1.0	1105	21	6	Dense (10YR, 4/4) Dark yellowish Brown, coarse grained sand with a few gravel pebbles, poorly graded, dry.	SP	NA	HLT = 0.0 ppm; BG = 160 cpm; ~~121401 Archive~~
1.5	1105 121405 121406 121407	10	6	SAA Spoon 1 ↑	SP	NA	HLT = 0.0 ppm; BG = 160 cpm
2.0	1110	7	6	SAA	SP	NA	HLT = 0.0 ppm; BG = 170 cpm; 121408 - Archive
2.5	1110	8	6	Very stiff (10YR, 4/1) Dark gray, medium plasticity, silty clay, dry.	CL	2.0	HLT = 0.0 ppm; BG = 180 cpm; 121409 - Archive
3.0	1110 121410 121411 121412	8	6	SAA Spoon 2 ↑	CL	2.0	HLT = 0.0 ppm; BG = 160 cpm
3.5	1115	7	6	Stiff (5Y, 3/1) Very dark gray, silty clay; medium to high plasticity, dry.	CL	1.0	HLT = 0.0 ppm; BG = 170 cpm; 121413 - Archive
4.0	1115	8	6	SAA	CL	1.0	HLT = 0.0 ppm; BG = 170 cpm; 121414 - Archive
4.5	1115 8	8	3	SAA Spoon 3 ↑	CL	1.5	HLT = 0.0 ppm; BG = 180 cpm; 121415 - Archive
5.0	1140	4	6	SAA	CL	1.5	HLT = 0.0 ppm; BG = 160 cpm; 121416 - Archive

NOTES

Driller - Rock Drill Contractor

Driller - Kevin Myers

Helper - Mike Leon

Log - Mark Lo[illegible]

SAA Same as Above

Background

HLT - 0.0 ppm

BG = 160-170 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. CRU-5 50.03.18 Boring 11099	
BORING NUMBER. 11099	COORDINATES: NA	DATE 7-10-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 7-10-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-11-93
DRILLING METHODS Hollow Stem Auger		PAGE 2 OF 3

DEPTH (FT) 5.0	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.5	1140	8	6	STIFF (5Y, 3/1) VERY DARK GRAY, SILTY CLAY, MEDIUM TO HIGH PLASTICITY, DRY.	CL	1.0	HT = 0.0 ppm Bg = 150 cpm
6.0	1140	6	6	MEDIUM DENSE (5YR, 5/1) BLACK, CLAYEY SILT DRY. Sample 4 ↑	ML	NA	HT = 0.0 ppm Bg = 160 cpm
6.5	1210 121419 121426 121421	4	6	STIFF (5Y, 3/1) VERY DARK GRAY, SILTY CLAY MEDIUM PLASTICITY, DRY.	CL	1.0	HT = 0.0 ppm Bg = 150 cpm
7.0	1210	6	6	VERY STIFF (2.5Y, 3/2) VERY DARK GRAYISH BROWN. SILTY CLAY, LOW PLASTICITY, DRY	CL	2.5	HT = 0.0 ppm Bg = 120 cpm
7.5	1210	11	6	VERY STIFF (10YR, 3/3) DARK BROWN, SILTY CLAY LOW PLASTICITY, DRY Sample 5 ↑	CL	2.5	HT = 0.0 ppm Bg = 160 cpm
8.0	1226	2	6	VERY STIFF (10YR, 3/2) VERY DARK GRAY, SILT BROWN SILTY CLAY, medium PLASTICITY, DRY.	CL	2.5	HT = 0.0 ppm Bg = 170 cpm
8.5	1226	4	6	VERY STIFF (10YR, 4/4) DARK yellowish brown, SILTY CLAY, medium PLASTICITY. DRY.	CL	2.5	HT = 0.0 ppm Bg = 180 cpm
9.0	1226	7	6	SAA Sample ↑	CL	1.5	HT = 0.0 ppm Bg = 170 cpm
9.5	1236 121427 121428 121429	2	6	VERY STIFF (10YR, 4/4) DARK yellowish brown SILTY CLAY, medium PLASTICITY. DRY	CL	2.0	HT = 0.0 ppm Bg = 170 cpm
10.0	1236	4	6	SAA	CL	2.0	HT = 0.0 ppm Bg = 180 cpm

NOTES

Driller - Penn Drill Contractor

Driller - Kevin Myers

Helper - Mike Lewis

Rig: Mobile B-61

SAA - Same as Above

Background

HT = 0.0 ppm

Bg = 160-180 cpm

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CRU-5 50.03.18	PROJECT NAME. Boring 11099	
BORING NUMBER. 11099	COORDINATES: NA	DATE 7-10-93
ELEVATION: NA	GWL: Depth Date/Time	DATE STARTED 7-10-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-10-93
DRILLING METHODS Hollow Stem Auger		PAGE 3 OF 3

	DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 (FT)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	10.0							
	10.5		6	6	FIRM STIFF (10YR, 4/4) DARK yellowish Brown, Silty CLAY, medium PLASTICITY, DRY 10.25	CL	2.0	HT = 0.0 ppm Bg = 100 cpm
7-10-93					MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN CLAYEY SILT with COARSE SILTY PARTINGS, DRY. SPOON 7	ML		
7-11-93	11.0		5	6	STIFF (10YR, 4/4) DARK YELLOWISH BROWN, SILTY CLAY MEDIUM PLASTICITY, MOIST. Some Silty laminae throughout	CL	1.5	HT = 0.0 ppm Bg = 170 cpm
	11.5		5	6	SAA	CL	1.5	HT = 0.0 ppm Bg = 100 cpm
	12.0		7	6	SAA SPOON 8	CL	1.5	HT = 0.0 ppm Bg = 120 cpm
	12.5		3	6	STIFF (10YR, 4/3) DARK BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST. Silty partings	CL	1.5	HT = 0.0 ppm Bg = 100 cpm
	13.0		3	6	SAA	CL	1.5	HT = 0.0 ppm Bg = 100 cpm
	13.5		3	6	MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN, CLAYEY SILT, MOIST 13.25	ML	NA	HT = 0.0 ppm Bg = 100 cpm
					STIFF (10YR, 4/3) DARK BROWN, SILTY CLAY, MEDIUM PLASTICITY, MOIST. SPOON 9	CL	1.5	
	14.0		5	6	SAA, MOIST	CL	1.5	HT = 0.0 ppm Bg = 170 cpm
	14.5		7	6	SAA, MOIST	CL	1.5	HT = 0.0 ppm Bg = 100 cpm
	15.0		15	6	MEDIUM DENSE (10YR, 4/4) DARK YELLOWISH BROWN CLAYEY SILT, wet. Loss of water in the spoon. SPOON 10	ML	NA	HT = 0.0 ppm Bg = 100 cpm

NOTES

Driller - Penn Drill Contractor

Driller - Kevin Myers

Helper - Mike Sentley

Rig Mobile 80

SAA - Same as Above

Background HT = 0.0 ppm Bg = 100 cpm

FERNALD
RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME GRO-5 SS.03.18
PROJECT NO. SS.03.18
BORING NO. 11099
PIEZOMETER NO. 11099

FIELD ENG./GEO. O. Costello
CHECKED BY
DATE OF INSTALLATION 7-12-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT 4¼ inch ID augers
CASING SIZE (S) USED:
SIZE NA FROM NA
SIZE NA FROM NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS NA HOLES NA SCREEN NA
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

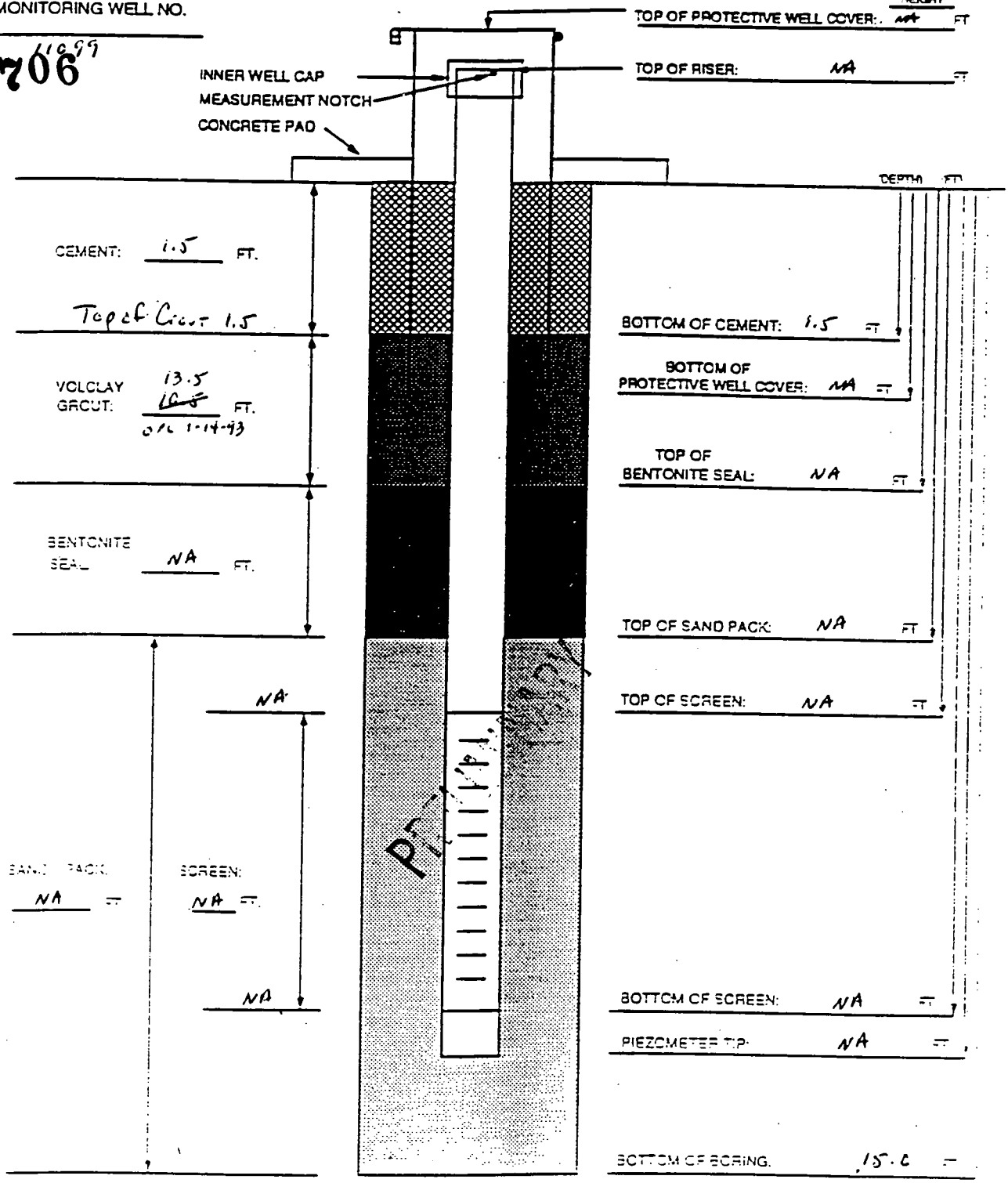
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS: Cement	0.0	1.5	
[illegible]	TOP 1.5	BOTTOM 15.0	TOP NA BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP NA BOTTOM
SAND	TOP NA	BOTTOM NA	TOP NA BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP NA BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP NA BOTTOM
PIEZOMETER TIP	NA		
BOTTOM OF BOREHOLE	15.0		
FILL AFTER INSTALLATION	NA		

WAS PIEZOMETER FLUSHED AFTER INSTALLATION? YES ___
WAS A PUMP TEST PERFORMED ON THE PIEZOMETER? YES ___

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

4706 (1699)

INSTALLATION DATE: 7-12-93



BOREHOLE DIAMETER _____ IN

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (1 GALLON BUCKETS): NA
NO. OF VOLCLAY GROUT: 3
WEIGHT OF CEMENT: 1
WEIGHT OF WATER USED: 25 Gallons
OTHER

NOTES:

1) RISER PIPE IS NA IN. I.D. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. I.D. 316 STAINLESS STEEL PIPE WITH NA IN SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE: NA
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESES INDICATE GROUND LEVEL
7) WELL CASING HAS LOCKING COVER WITH PADLOCK

GEOLOGIST ENGINEER: C. Gutekla

VISUAL CLASSIFICATION OF SOILS

4706

PROJECT NUMBER. CW-5 50.03.18	PROJECT NAME. 50.03.18		
BORING NUMBER. 11095	COORDINATES:		DATE 7-15-93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED 7-15-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-16
DRILLING METHODS Hollow Stem Auger 4¼ in ID			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 in	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0							
0.5	1231 121487 A 121488 121489	9	6	MEDIUM DENSE (2.54, 313) DARK OLIVE BROWN, medium to coarse grained sand with some gravel cobbles. Poorly graded. Dry	SC	NA	MT = 0.0 ppm Bg = 50 cpm
1.0	1231	10	6	SAA	SC	NA	MT = 0.0 ppm Bg = 40 cpm 121490-A
1.5	1231 121491 A 121492 121493	7	6	SAA SA 21	SC	NA	MT = 0.0 ppm Bg = 40 cpm
2.0	1236	15	6	DENSE (2.54, 413) olive brown, medium to coarse grained sand with gravel cobbles. Dry.	SC	NA	MT = 0.0 ppm Bg = 60 cpm 121494-A
2.5	1236	15	6	SAA	SC	NA	MT = 0.0 ppm Bg = 50 cpm 121495-A
3.0	1236 121496 A 121497 121498	16	6	NO RECOVERY SA 22	SC	NA	MT = 0.0 ppm Bg = 40 cpm
3.5	1245	11	6	MEDIUM DENSE (10YR, 3/4) DARK YELLOWISH BROWN, medium to coarse grained sand poorly graded. Dry.	SC	NA	MT = 0.0 ppm Bg = 50 cpm 121497-A
4.0	1245	11	6	SAA	SC	NA	MT = 0.0 ppm Bg = 40 cpm 121498-A
4.5	1245	9	6	SAA SA 23	SC	NA	MT = 0.0 ppm Bg = 40 cpm 121499-A
5.0	1236	7	6	VERY STIFF (10YR, 4/3) brown, silty clay, low to medium plasticity, Dry.	CL	2.5	MT = 0.0 ppm Bg = 40 cpm 121500-A

NOTES

Driller - Penn Drill
Contractor

Driller - Mike Conking
Helper - Doug Nelson
Rig - Mobil B 80

SAA Same as above

Background
MT = 0.0 pp
Bg = 40 c

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER. CEW-5 50.03.18	PROJECT NAME. 50.03.18		
BORING NUMBER. 11095	COORDINATES:		DATE 7-15-93
ELEVATION: 4706	GWL: Depth	Date/Time	DATE STARTED 7-15-93
ENGINEER/GEOLOGIST O. Costello	Depth	Date/Time	DATE COMPLETED: 7-15-93
DRILLING METHODS Hollow Stem Auger 4¼ in ID			PAGE 2 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0							
5.5	1300	7	6	VERY STIFF (10YR 4/8) Brown, silty CLAY, MEDIUM PLASTICITY, DRY.	CL	2.5	MT = 0.0 ppm; Bg = 50 cpm; 121903-A
6.0	1306	7	6	SAA Sample 4	CL	2.5	MT = 0.0 ppm; Bg = 40 cpm; 121904-A
6.5	1332 121905 121906 121907	6	6	VERY STIFF (10YR, 5/6) yellowish brown; silty clay MEDIUM PLASTICITY, DRY	CL	3.5	MT = 0.0 ppm; Bg = 50 cpm
7.0	1332	9	6	SAA	CL	3.5	MT = 0.0 ppm; Bg = 40 cpm; 121908-A
7.5	1332	11	6	SAA Sample 5	CL	3.5	MT = 0.0 ppm; Bg = 40 cpm; 121909-A
8.0	1340	5	6	VERY STIFF (2.5Y, 5/6) light olive brown, silty CLAY medium to high plasticity, some silty laminae, moist	CL	2.5	MT = 0.0 ppm; Bg = 50 cpm; 121910-A
8.5	1340	8	6	SAA	CL	2.5	MT = 0.0 ppm; Bg = 60 cpm; 121911-A
9.0	1340	10	6	SAA Sample 6	CL	2.5	MT = 0.0 ppm; Bg = 40 cpm; 121912-A
9.5	1359 121913 121914 121915	5	6	STIFF (2.5Y, 5/6) light olive brown; silty CLAY medium to high plasticity, silty laminae thicker and more frequent, moist	CL	.50	MT = 0.0 ppm; Bg = 40 cpm
10.0	1359	6	6	SAA	CL	.50	MT = 0.0 ppm; Bg = 40 cpm; 121916-A

NOTES

Driller - Penn Drill
Contractor
Driller - Scott
Helper -

Background
MT = 0.0 pp
Bg = 40 cp

Rig

VISUAL CLASSIFICATION OF SOILS 4706

PROJECT NUMBER. CEU-5 50.03.18	PROJECT NAME. 50.03.18	
BORING NUMBER. 11095	COORDINATES:	DATE 7-15-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7-15-93
ENGINEER/GEOLOGIST O. Costello	Depth Date/Time	DATE COMPLETED: 7-15-93
DRILLING METHODS Hollow Stem Auger 4¼ in ID		PAGE 3 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
10.0				DISTINCT COLOR CHANGE			
10.5	1359	9	6	STIFF (2.5Y, 4/2) DARK GRAYISH BROWN, SILTY CLAY MEDIUM PLASTICITY, MOIST Sample 71	CL	1.0	MT = 0.0 ppm Bg = 40 cpm 121917-A
11.0	1410	7	6	SAA	CL	1.5	MT = 0.0 ppm Bg = 60 cpm 121918 A
11.5	1410	7	6	MEDIUM DENSE (2.5Y, 5/2) VERY DARK GRAYISH BROWN, CLAYEY SILT, WET	ML	NA	MT = 0.0 ppm Bg = 50 cpm 121919-A
12.0	1410	7	6	STIFF (2.5Y, 4/2) DARK GRAYISH BROWN, SILTY CLAY, MEDIUM PLASTICITY, gotten 0.5 ft of silty material WET. Total Depth 12.0 ft	CL	1.5	MT = 0.0 ppm Bg = 50 cpm 121920 A
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm
							MT = ppm Bg = cpm

NOTES

Driller - Penn Drill Contractor

Driller - See P.1.

Helper -

Rig

Site - Stone as above

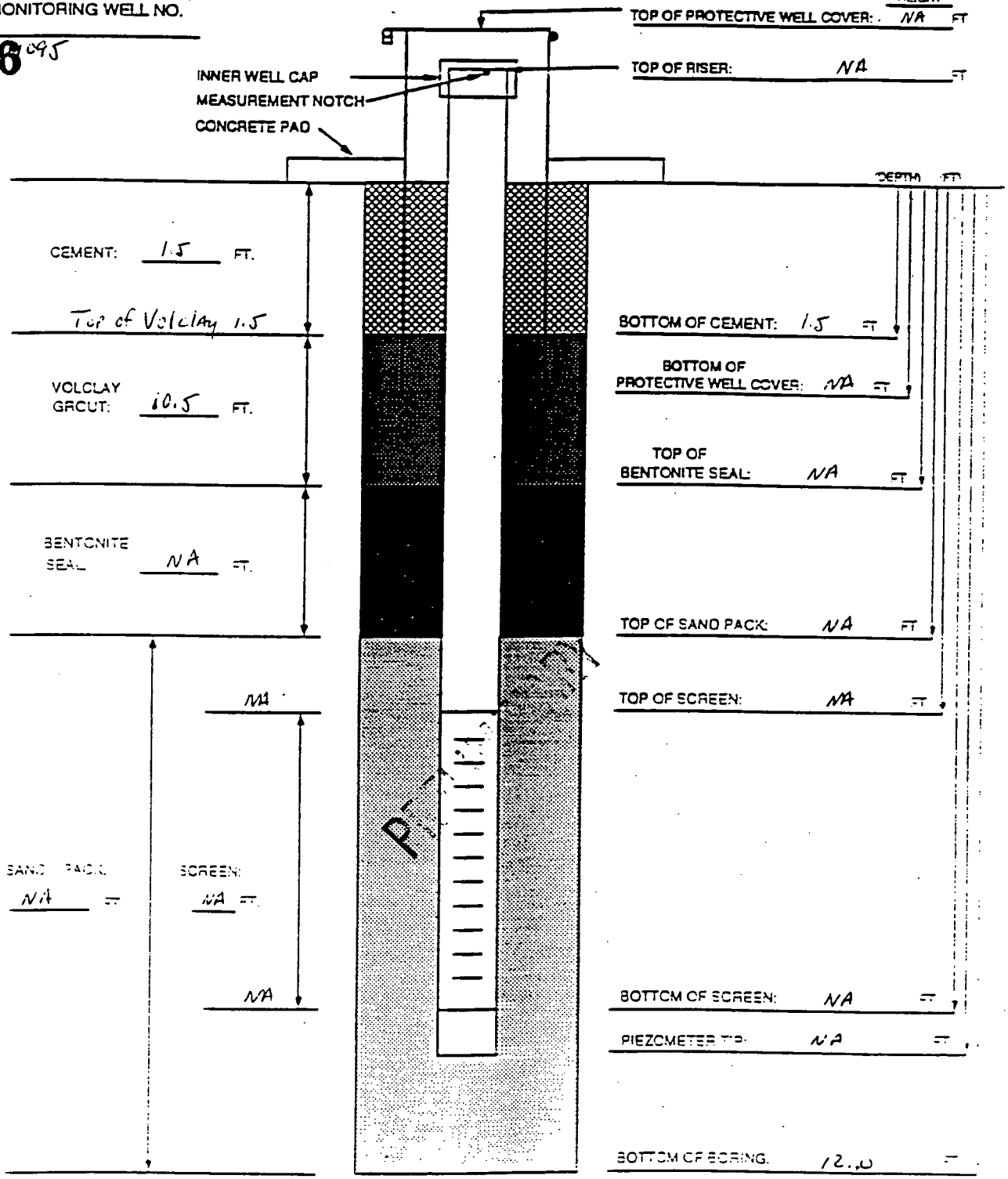
Background MT = 0.0 pp

Bg = 10 cp

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.

4706 095

INSTALLATION DATE: 07-15-93



BOREHOLE DIAMETER 8 IN

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (# OF 50 LB BUCKETS): NA
OF VOLCLAY GROUT: 2
OF CEMENT: 2
OF WATER USED: 20 Gallons
OTHER:

NOTES:

1) RISER PIPE IS NA N.O. 316 STAINLESS STEEL PIPE, FLUSH THREADED JOINTS.
2) SCREEN IS NA N.O. 316 STAINLESS STEEL PIPE WITH NA N SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED PLUG.
GEOLOGIST ENGINEER: O Lostrello

4) WATER DEPTH AND DATE: NA
5) TOP OF CASING IS SECURED STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING IS [illegible] COVER [illegible]

FERNALD
RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU-5
PROJECT NO. 50.03.18
BORING NO. 11095
PIEZOMETER NO. 11095

FIELD ENG./GEO. O. Costello
CHECKED BY
DATE OF INSTALLATION 07-15-93

BOREHOLE DRILLING

DRILLING METHOD Hollow Stem Auger 4¼in ID
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT Hollow Stem Auger
CASING SIZE (S) USED:
SIZE NA FROM NA
SIZE NA FROM NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE:
SLOTS NA HOLES NA SCREEN NA
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA : NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE ( )		ELEVATION
TOP OF RISER PIPE	NA		
GROUND SURFACE	0.0		
BOTTOM OF PROTECTIVE PIPE	NA		
BOREHOLE FILL MATERIALS:	0.0	1.5	
Cement GROUT SLURRY	TOP NA	BOTTOM NA	TOP / BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP BOTTOM
SAND	TOP NA	BOTTOM NA	TOP BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP BOTTOM
PIEZOMETER TIP	NA		
BOTTOM OF BOREHOLE	12.0		
DATE AFTER INSTALLATION	NA		

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NA NA
WERE ANY TEST PERFORMED ON THE PIEZOMETER? YES NA NA

FERNALD
RI/FS 4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRUS	
BORING NUMBER: B #(PA-SD-03) 11196	COORDINATES:	DATE: 7-12-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-12-93
ENGINEER/GEOLOGIST: P. RILEY	Depth Date/Time	DATE COMPLETED: 7-12-93
DRILLING METHODS: AUGER		PAGE 1 OF 4

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0.0	121179 121180 121181 1335 7-12-93	17	6	VERY STIFF, BROWNISH YELLOW (10 YR 6/6), CLAYEY SILT, WITH SOME GRAVEL & ROOTLETS, SLIGHT PLASTICITY, DRY TAL #1	ML	4.0	MICROTIP = 0.0 ppm BG = 110 CPM
0.5	121182 1335 7-12-93	30	6	SAA	ML	4.0	
1.0	121183 121197 121198 1335 7-12-93	24	6	SAA TAL # 2	ML	4.0	
1.5	121184 1405 7-12-93	27	6	VERY STIFF DARK YELLOWISH BROWN, (10 YR 4/6), SILTY CLAY WITH SOME GRAVEL, MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	4.0	MICROTIP = 0.0 ppm BG = 100 CPM
2.0	121185 1405 7-12-93	37	6	SAA	CL	3.5	
2.5	121186 121187 121188 1405 7-12-93	24	6	STIFF, YELLOWISH BROWN (10 YR 5/6), SILTY CLAY, WITH SOME SAND MEDIUM TO HIGH PLASTICITY, MOIST TAL # 3	CL	1.5	
3.0	121189 1440 7-12-93	14	6	SAA	CL	1.5	MICROTIP = 0.0 ppm BG = 100 CPM
3.5	121190 1440 7-12-93	17	6	SAA	CL	1.0	
4.0	121191 1440 7-12-93	15	6	SOFT, YELLOWISH BROWN (10 Y 5/6), SANDY CLAY, WITH TRACE OF GRAVEL, MEDIUM PLASTICITY, WET	CL	LESS THAN 0.5	
4.5	121192 121193 121194 1515 7-12-93	5	6	SAA	CL	LESS THAN 0.5	MICROTIP = 0.0 ppm BG = 110 CPM
5.0							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JEFF BENTLEY
Helper : MIKE LITTLETON

SAA = Same As Above
N/A = Not Applicable

Background =
MICROTIP = 0.0 ppm
BG = 100 CPM

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5		
BORING NUMBER: B#(PA-SD-03 #1196)	COORDINATES:	DATE: 7-12-93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-12-93	
ENGINEER/GEOLOGIST: P. RILEY	Depth Date/Time	DATE COMPLETED: 7-12-93	
DRILLING METHODS: AUGER		PAGE 2 OF 4	

DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	121175 1515 7-12-93	15	6	MEDIUM DENSE, BROWN (10 YR 5/8) CLAYEY SAND (POORLY GRADED), WITH TRACE OF GRAVEL, WET TAL #4	SC	NA	SEE PREVIOUS PAGE
5.5	121196 1515 7-12-93	12	6	SAA	SC	NA	
6.0							MICROTIP = PPM BY = CPM
							MICROTIP = PPM BY = CPM
							MICROTIP = PPM BY = CPM

TOTAL DEPTH 6.0 FT

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JEFF BENTLEY
Helper : MIKE LITTLETON

SAA = Same As Above
N/A = Not Applicable

Background = 0.0 ppm
100 cpm

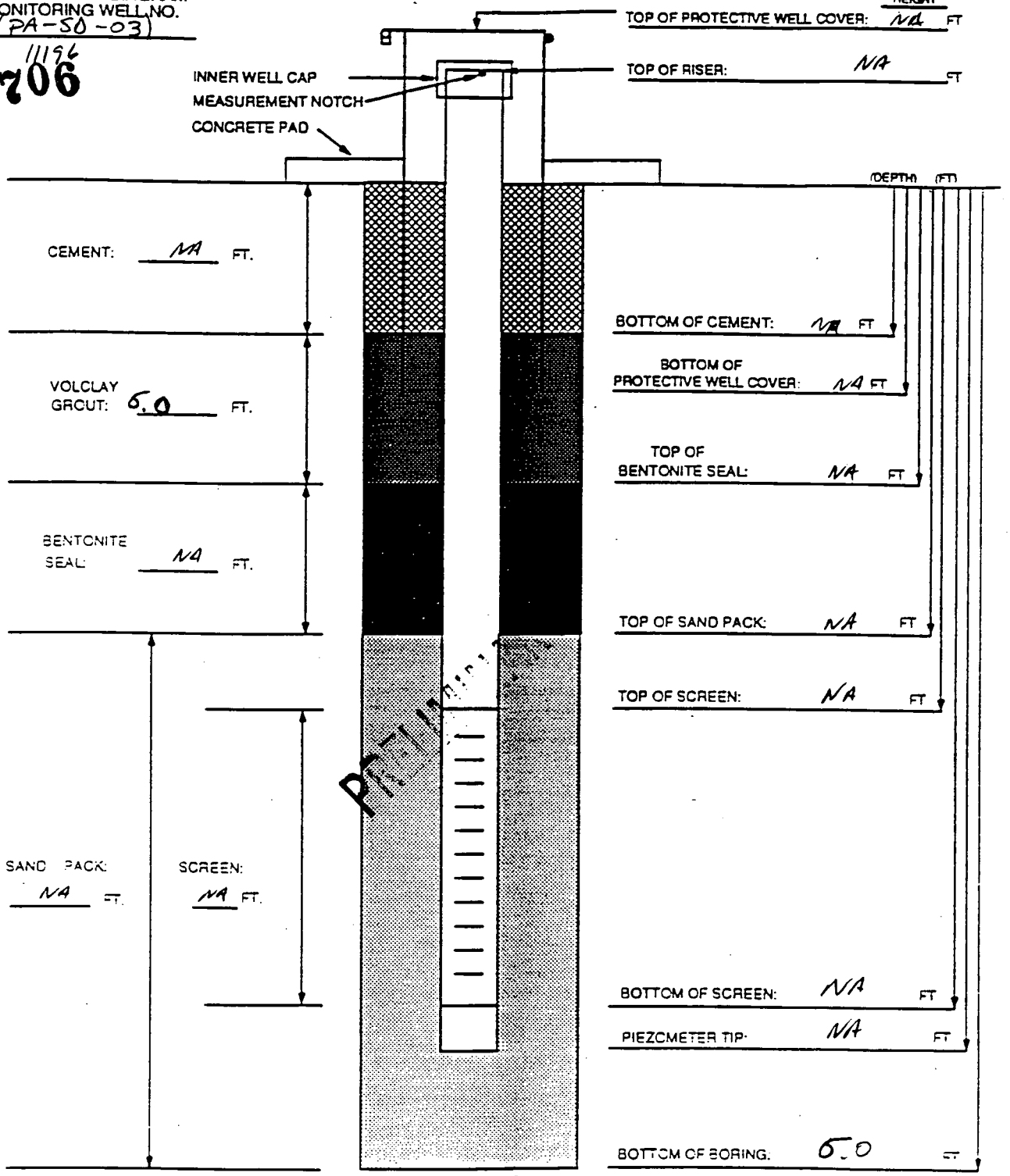
* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO.
(PA-SO-03)

11196
4706

INSTALLATION DATE: 7-12-93

HEIGHT
TOP OF PROTECTIVE WELL COVER: NA FT
TOP OF RISER: NA FT



BOREHOLE DIAMETER: 8.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 2 BAGS
AMOUNT OF CEMENT: NA
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA
DATE: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST ENGINEER: P. RILEY

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 5 FIELD ENG./GEO. RILEY DATE 7-12-9
PROJECT NO. 50.0318 CHECKED BY DATE
BORING NO. (PA-50-03) 11196
PIEZOMETER NO. NA DATE OF INSTALLATION

BOREHOLE DRILLING

DRILLING METHOD Auger	TYPE OF BIT Auger
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA
FLUID NA FROM NA TO NA	SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA	RISER PIPE MATERIAL NA
DIAMETER OF PERFORATED SECTION NA	RISER PIPE DIAMETERS:
PERFORATION TYPE: NA	O.D. NA I.D. NA
AR 7-13-93 ~~SLOTS~~ ☐ ~~HOLES~~ ☐ ~~SCREEN~~ ☐	LENGTH OF PIPE SECTIONS NA
AVERAGE SIZE OF PERFORATIONS NA	JOINING METHOD NA
TOTAL PERFORATED AREA NA	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA	OTHER PROTECTION NA
PROTECTIVE PIPE O.D. NA	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0.0	BOTTOM 6.0	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	6.0			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS NA

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME		
BORING NUMBER 11202	COORDINATES		DATE 13-14 July 1993
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 13 July 1993
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 14 July 1993
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 3

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	13400 121523 121524 121525	7	6	HARD (2.5Y, 4/4) OLIVE BROWN SILTY CLAY TRACE SAND, ORGANICS, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0.4 BY: 100 A
1	121526 121527 121528 121529 1419	12	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY TRACE SUBANGULAR GRAVEL, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	ARCHIVE
	13400 121530	11	6	SAA	CL	>4.5	TIME 1419 A
2		25	6	SAA	CL	>4.5	MT: 0.6 BY 80 ARCHIVE
	121531 121532 121533 121534 1454	31	6	SAA	CL	>4.5	ARCHIVE
3		41	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE ORANGE MOTTLES, SUBANGULAR GRAVEL, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	TIME 1454 A
	13400 121535	45	6	HARD (2.5Y, 5/3) LIGHT OLIVE BROWN SILTY CLAY, TRACE YELLOW MOTTLES, SAND, GRAVEL, VERY LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0 BY: 70 ARCHIVE
4	121536 121537 1534	41	6	HARD (2.5Y, 5/6) LIGHT OLIVE BROWN SILTY CLAY, TRACE GRAY MOTTLES, SAND, GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	ARCHIVE
	14000 121538 121539 121540	38	6	SAA	CL	>4.5	ARCHIVE TIME 1534
5	121541 0855	25	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SAND, GRAVEL, GRAY MOTTLES, MEDIUM PLASTICITY, MOIST	CL	>4.5	MT: 0 BY: 70 A
		35	6	SAA	CL	>4.5	ARCHIVE
				BOTTOM OF BORING			TIME 0855

DRILLING FIRM: PENN DRILL
DRILLERS: RON CONNERS, TED BAIK
RIG: SIMCO

UNITS MEASURED BACKGROUND READINGS
MT = PPM MT 0.4 PPM
BY = CPM BY 80 CPM
2 = CPM 2 — CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

THIN SECTION 121542

RI/FS
4706

15 JUL 93
BEM

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS / PHASE II FIELD ENG./GEO. B.E. MULLER DATE 15 JUL.
PROJECT NO. 50.03.18 CHECKED BY _____ DATE _____
BORING NO. 11202
PIEZOMETER NO. N/A DATE OF INSTALLATION _____

BOREHOLE DRILLING

DRILLING METHOD SPLIT SPOON
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT SPLIT SPOON
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A

RISER PIPE MATERIAL N/A
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A
PROTECTIVE PIPE O.D. N/A

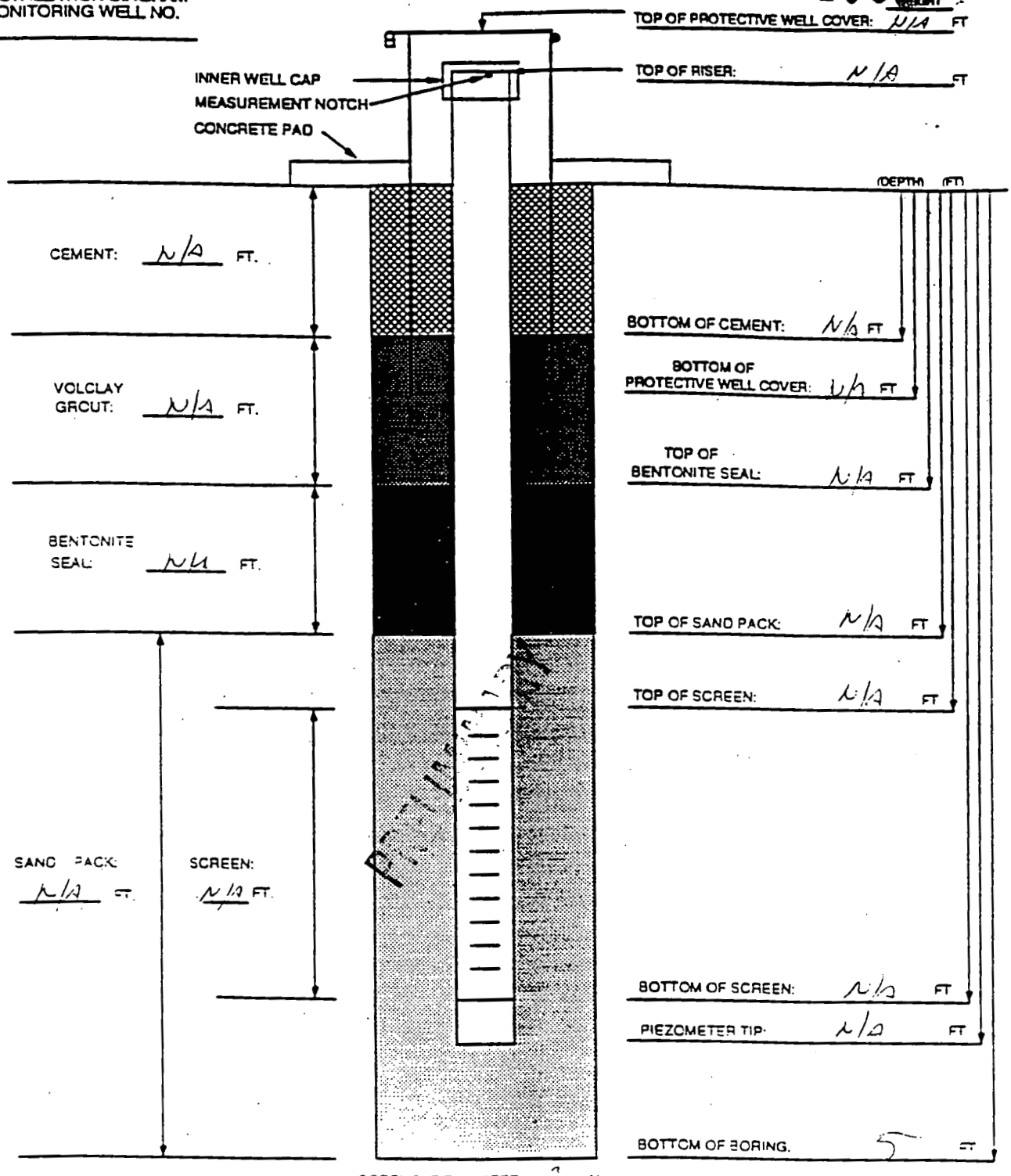
OTHER PROTECTION N/A

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT / SLURRY	TOP 0	BOTTOM 5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP ↓	BOTTOM ↓	TOP	BOTTOM
GRAVEL	TOP ↓	BOTTOM ↓	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	5			
GWL AFTER INSTALLATION	N/A			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS _____

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 4706

INSTALLATION DATE: [illegible]



BOREHOLE DIAMETER: 2 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: N/A
OTHER: FILLED WITH CUTTINGS
TASK: [illegible]

NOTES.

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER: [illegible]

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS / PHASE II		
BORING NUMBER 11203	COORDINATES		DATE 11JUL93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 11JUL93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 11JUL93
DRILLING METHODS HAND AUGER			PAGE 1 OF 4

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 1 ~/4 1	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	11JUL 121501 121502 121503 0742	N/A	6	HARD (2.5Y, 4/4) OLIVE BROWN, SILTY CLAY, TRACE SAND ORGANICS, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 1.5 B.V. 50 A TIME: 0742
1	11JUL 121504 0801	N/A	6	HARD (10YR, 5/4) YELLOWISH BROWN, SILTY CLAY, TRACE ORANGE MOTTLES, ANGULAR FINE ~~SAND~~ GRAVEL (BRA ISHLS) LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	MT: 0 B.V. 70 ARCHIVE TIME: 0801
	11JUL 121505 121506 121507 0818	N/A	6	HARD (10YR, 5/6) YELLOWISH BROWN, SILTY CLAY, TRACE ORANGE MOTTLES, ANGULAR FINE GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	4.0	MT: 0 B.V: 50 A TIME: 0818
2	11JUL 121508 1050	N/A	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY TRACE GRAY AND ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2.75	MT: 0 B.V. 60 ARCHIVE TIME 1050
	11JUL 121509 1104	N/A	6	STIFF (2.5Y, 5/3) LIGHT OLIVE BROWN, SILTY CLAY, TRACE GRAY AND ORANGE MOTTLES, ROUNDED GRAVEL, MEDIUM PLASTICITY, MOIST	CL	1.5	MT: 0 BV: 60 ARCHIVE TIME: 1104
3	11JUL 121510 121511 121512 1115	N/A	6	STIFF (2.5Y, 6/2) LIGHT BROWNISH GRAY, ~~TRA~~ SILTY CLAY, TRACE (SMALL 93 BRA) SAND AND YELLOW MOTTLES, MEDIUM PLASTICITY, MOIST	CL	1.5	MT: 0 BV: 70 A TIME: 1115

DRILLING FIRM: FERRCO/IT
DRILLERS: TERRY KONKLIN
RIG: TERRY KONKLIN

DESCRIPTION BASED ON MUNSELL

UNITS MEASURED
MICROTIP = PPM
BV = CPM
α = CPM

BACKGROUND READINGS
MICROTIP: 2.0 PPM
BV: 60 CPM
α: — CPM

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

FERNALD
RI/FS

44706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50-03.13	PROJECT NAME CRUS / PHASE II		
BORING NUMBER 11203	COORDINATES		
ELEVATION	GWL. Depth	Date/Time	DATE 1/NOV 93
ENGINEER GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE STARTED 1/NOV 93
DRILLING METHODS HAND AUGER			DATE COMPLETED 1/NOV 93
			PAGE 2 OF 4

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER 1 ~/4	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1NUL 121513 1140	N/A	6	STIFF (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, TRACE COARSE SUBANGULAR SAND, GRAY MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2.0	MT: 0 B.Y. 60 ARCHIVE TIME: 1140
	1NUL 121514 1142	N/A	6	SAA	CL	2.5	M.T: 0 B.Y. 50 ARCHIVE TIME: 1142
4	1NUL 121515 1156	N/A	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SAND, ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2.25	MT: 0 B.Y: 50 ARCHIVE TIME: 1156
5	1NUL 121516 121517 121518 1201	N/A	6	SAA	CL	2.25	MT: 0 B.Y. 60 A TIME 1201
	N/A			BOTTOM OF BORING			MT: BY: TIME:
	N/A						MT: BY: TIME

DRILLING FIRM: FERNCO/IT
DRILLERS: TERRY KORKLIN
RIG: TERRY KORKLIN

UNITS MEASURED
MICROTIP = ppm
BY = CPM
α = CPM

BACKGROUND READINGS
MICROTIP: 0 ppm
BY: 60 CPM
α: — CPM

DESCRIPTION BASED ON MUNSELL

NO RECOVERY (NR)
SAME AS ABOVE (SAA)

FERNALD
RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS/PRASE II
PROJECT NO. CO.03.12
BORING NO. 11203
PIEZOMETER NO. N/A

FIELD ENG./GEO. BE MULLER DATE 15JUL5
CHECKED BY _____ DATE _____
DATE OF INSTALLATION 11JUN5?

BOREHOLE DRILLING

DRILLING METHOD HAND AUGER
DRILLING FLUID (S) USED:
FLUID N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A

TYPE OF BIT HAND AUGER
CASING SIZE (S) USED:
SIZE N/A FROM N/A TO N/A
SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE NONE
DIAMETER OF PERFORATED SECTION N/A
PERFORATION TYPE:
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS N/A
TOTAL PERFORATED AREA N/A

RISER PIPE MATERIAL NONE
RISER PIPE DIAMETERS:
O.D. N/A I.D. N/A
LENGTH OF PIPE SECTIONS N/A
JOINING METHOD N/A

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NONE
PROTECTIVE PIPE O.D. N/A

OTHER PROTECTION NONE

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP ↓	BOTTOM ↓	TOP	BOTTOM
GRAVEL	TOP ↓	BOTTOM ↓	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP				
BOTTOM OF BOREHOLE	5			
GWL AFTER INSTALLATION				

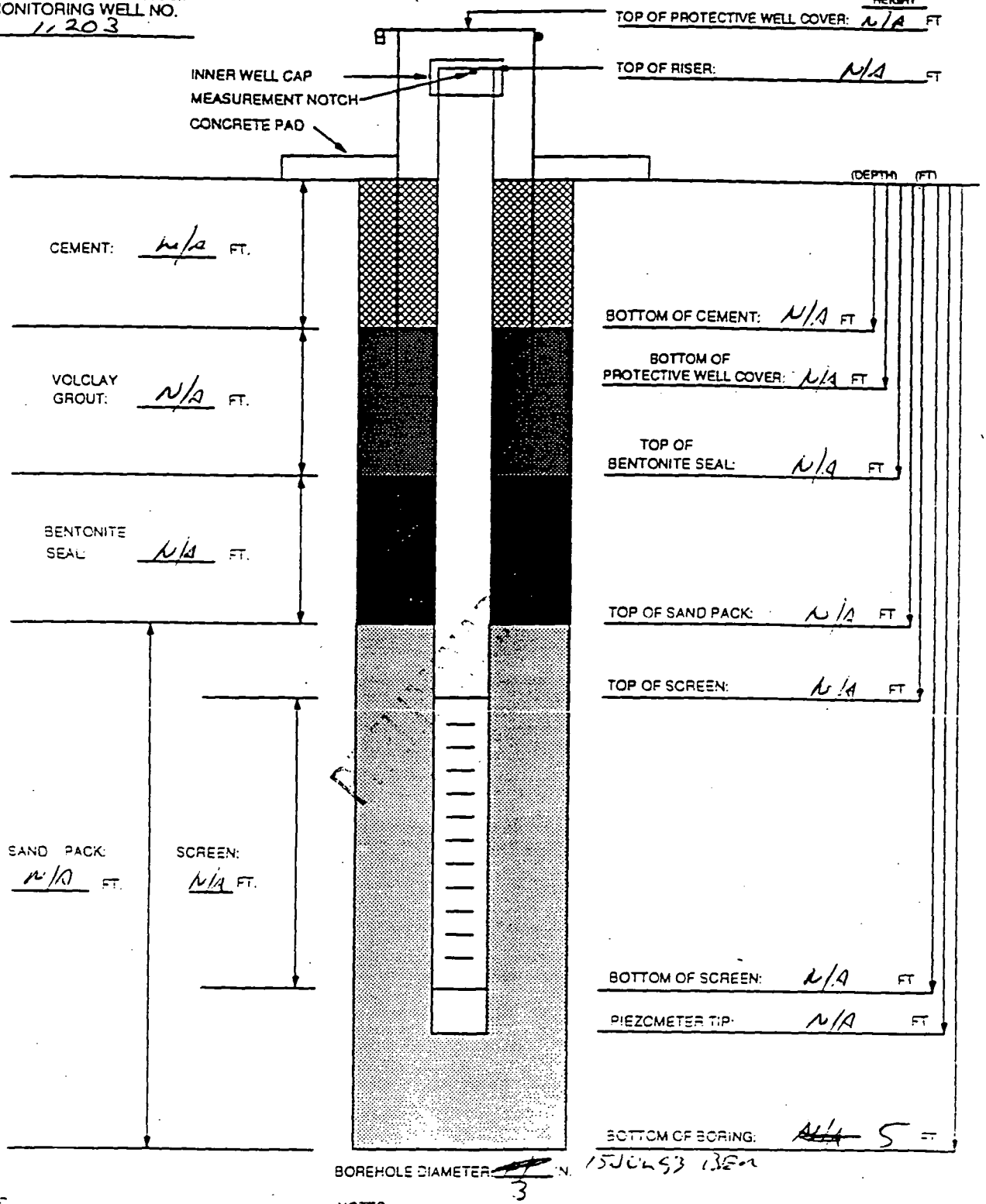
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

4706 4

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1203

INSTALLATION DATE: 11 JUL 93



	HEIGHT	
TOP OF PROTECTIVE WELL COVER:	N/A	FT
TOP OF RISER:	N/A	FT

	(DEPTH) (FT)	
BOTTOM OF CEMENT:	N/A	FT
BOTTOM OF PROTECTIVE WELL COVER:	N/A	FT
TOP OF BENTONITE SEAL:	N/A	FT
TOP OF SAND PACK:	N/A	FT
TOP OF SCREEN:	N/A	FT
BOTTOM OF SCREEN:	N/A	FT
PIEZOMETER TIP:	N/A	FT
BOTTOM OF BORING:	~~N/A~~ 5	FT

15 JUL 93 1320

MATERIALS USED

SAND TYPE AND QUANTITY: N/A
BENTONITE PELLETS (5-GALLON BUCKETS):
BAGS OF VOLCLAY GROUT:
AMOUNT OF CEMENT:
AMOUNT OF WATER USED: N/A
OTHER: BACKFILLED WITH CUTTINGS
TASK: 50.03.18

NOTES:

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE N/A FT N/A
5) TOP OF CASING IS SECURED W[illegible] STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER: B. F. MULLER

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-5 Additional Wells		
BORING NUMBER: 21043	COORDINATES:	DATE 6/25/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/24	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/2	
DRILLING METHODS: Cable Tool		PAGE 1 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0910 119531 6/25/93	7	6	Hard. 2.5Y (5/4) Lt. olive brown silty clay w/gravel, dry no plasticity	CL	4.5	Mt = 0 ppm BG = 40 cpm
	0910 119532 6/25/93	8	3	SAA	CL	4.5	Mt = 0 ppm BG = 40 cpm
1		10	0	No Recovery DSO 6/25/93	NA	NA	Mt = NA BG = NA
	~~0915~~ DSO 6/25/93 ~~1104~~ DSO 6/25/93	3	0	~~Hard. 2.5YR (4/4) Dk yellowish brown silty clay w/gravel no plasticity, dry.~~ No Recovery	DSO 6/25/93 ~~CL~~ NA	~~4.5~~ NA	Mt = NA BG = NA
2		8	0	No Recovery	NA	NA	Mt = NA BG = NA
		9	0	No Recovery	NA	NA	Mt = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Burkhalter Ersu

Driller: Craig Carter

Bill O'Brien

Bkgd: Mt = 0 ppm BG = 40-60 cpm

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

4700

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-5 Additional Wells		
BORING NUMBER: 21043	COORDINATES:	DATE 6/25/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/24	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/25	
DRILLING METHODS: Cable Tool		PAGE 2 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0918 119533 6/25/93	4	6	Hard. 10YR(4/4) Dk yellowish brown silty clay w/gravel no plasticity, dry	cl	4.5	Mt = 0 ppm BG = 60 cpm
	0918 119534 6/25/93	8	4	SAA	cl	4.5	Mt = 0 ppm BG = 60 cpm
4		17	0	No Recovery	NA	NA	Mt = NA BG = NA
	0918 119535 6/25/93	13	6	Hard. 10YR(6/6) Olive yellow silty clay w/gravel, no plasticity, dry.	cl	4.0	Mt = 0 ppm BG = 40 cpm
5	0918 119536 6/25/93	14	6	SAA	cl	4.0	Mt = 0 ppm BG = 40 cpm
		13	0	No Recovery	NA	NA	Mt = 0 NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkeley Fru

Driller: Craig Carter, Billy Sibert

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Blank: Mt = 0 ppm BG = 40-60 cpm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-B Additional Wells		
BORING NUMBER: 21043	COORDINATES:	DATE 6/28/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/24/	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/2	
DRILLING METHODS: Cable Tool		PAGE 3 OF 2	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0920 119537 6/28/93	8	6	Mod. Dark 2.5Y(5/4) Lt olive brown silty sand, poorly graded, wet.	SP	NA	Mt = 0ppm BK = 40cpm
	0920 119538 6/28/93	8	3	SAA	SP	NA	Mt = 0ppm BK = 40cpm
7		7	0	No Recovery	NA	NA	Mt = NA BK = NA
	0925 119539 6/28/93	6	6	Mod Dark. 2.5Y(5/4) Lt. olive brown silty sand, poorly graded, wet.	SP	NA	Mt = 0ppm BK = 60cpm
8	0925 119540 6/28/93	8	5	SAA	SP	NA	Mt = 0ppm BK = 60cpm
		10	0	No Recovery	NA	NA	Mt = NA BK = NA

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkshire Fin

Driller: Craig Carter, Billy Sibert

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

Bkgd: Mt = 0 ppm BK = 40-60 cpm

4706

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU-B Additional Wells		
BORING NUMBER: 21043	COORDINATES:		DATE 6/28/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/24/93
ENGINEER/GEOLOGIST. D. O'Brien	Depth	Date/Time	DATE COMPLETED: 7/22
DRILLING METHODS: Cable Tool			PAGE 4 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6")	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	0935 119541 6/28/93	8	6	Mod. Dense 2.5Y(5/4) Lt olive brown silty sand w/gravel, well graded, wet	SW	NA	Mt = 0 ppm BK = 40 cpm
	0935 119542 6/28/93	8	6	SAA	SW	NA	Mt = 0 ppm BK = 40 cpm
10	0935 119543 6/28/93	10	6	SAA	SW	NA	Mt = 0 ppm BK = 40 cpm
	1005 119544 6/28/93	4	6	V. Stiff. 2.5Y(5/4) Lt olive brown sandy clay, low plasticity wet V. Stiff. 2.5Y(5/1) Gray clay w/ trace gravel, low plasticity moist	Cl	2.5	Mt = 0 ppm BK = 40 cpm
11	1005 119545 6/28/93	8	4	SAA	Cl	2.5	Mt = 0 ppm BK = 40 cpm
		10	0	No Recovery	NA	NA	Mt = NA BK = NA

NOTES.

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Birkbeck Erie

Driller Craig Carter, Billy Sibert

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Block: Mt = 0 ppm BK = 40-60 cpm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-B Additional Wells		
BORING NUMBER: 210B3	COORDINATES:	DATE	11/25/93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED	11/24
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED:	7/22
DRILLING METHODS: Cable Tool		PAGE 5	OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1010 119546 11/25/93	10	6	V. Stiff. 2.5Y(5/1) Gray clay w/ gravel, low plasticity moist.	CL	3.0	Mt = 0 ppm BG = 40 cpm
		13	0	No Recovery	NA	NA	Mt = NA BG = NA
13		14	0	No Recovery	NA	NA	Mt = NA BG = NA
	1015 119547 11/25/93	5	5	V. Stiff. 2.5Y(5/1) Gray clay w/ gravel, low plasticity moist	CL	2.0	Mt = 0 ppm BG = 40 cpm
14		10	0	No Recovery	NA	NA	Mt = NA BG = NA
		11	0	No Recovery	NA	NA	Mt = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkeyle Erie

Driller: Craig Cautis, Billy Sibert

SA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart.

Bkgd. Mt = 0 ppm BG = 40-60 cpm

4706

PROJECT NUMBER: 50.03.22	PROJECT NAME: RU-5 Additional Wells		
BORING NUMBER: 210113	COORDINATES:	DATE 6/25/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/24	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/22	
DRILLING METHODS: Cable Tool		PAGE 6 OF 8	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1320 119548 6/25/93	4	4	Stiff 2.5Y(5/1) Gray clay trace gravel, low plasticity dry	CL	1.75	Mt = 0 ppm BG = 40 cpm
		6	0	No Recovery	NA	NA	Mt = NA BG = NA
16		9	0	No Recovery	NA	NA	Mt = NA BG = NA
	1325 119549 6/25/93	5	5	Stiff. 2.5Y(4/1) Dk gray clay, trace gravel, low plasticity, dry	CL	1.75	Mt = 0 ppm BG = 40 cpm
17		7	0	No Recovery	NA	NA	Mt = NA BG = NA
		13	0	No Recovery	NA	NA	Mt = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Burkhart Fru

Driller: Craig Carter, Bill Sibert

SA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Bkgd: Mt = 0 ppm BG = 40-60 cpm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-B Additional Wells		
BORING NUMBER: 21013	COORDINATES:	DATE 6/28/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/24	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/2	
DRILLING METHODS: Cable Tool		PAGE 1 OF	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1335 119350 6/28/93	2	5	V. Stiff. 2.5Y(5/1) Gray gravelly clay, low plasticity, dry	CL	3.5	Mt = 0 ppm BG = 40 cpm
		4	0	No Recovery	NA	NA	Mt = NA BG = NA
19		10	0	No Recovery	NA	NA	Mt = NA BG = NA
	1340 119351 6/28/93	5	3	V. Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity dry	CL	2.5	Mt = 0 ppm BG = 40 cpm
20		9	0	No Recovery	NA	NA	Mt = NA BG = NA
		12	0	No Recovery	NA	NA	Mt = NA BG = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkbeile Esu

Driller: Craig Cautis, Bill Subert

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

SA - same as above

NA - not applicable

Bkgd: Mt = 0 ppm BG = 40-60 cpm

4706

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-B Additional Wells		
BORING NUMBER: 21013	COORDINATES:		DATE 6/25/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/24
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 7/25
DRILLING METHODS: Cable Tool			PAGE 8 OF 2

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1350 119552 6/25/93	3	6	Stiff. 2.5Y(5/1) Gray gravelly clay no plasticity, dry	CL	1.75	Mt = 0ppm BK = 40cpm
22	1350 119553 6/25/93	4	4	SAA	CL	1.75	Mt = 0ppm BK = 40cpm
		7	0	No Recovery	NA	NA	Mt = NA BK = NA
23	1355 119554 6/25/93	6	4	V. Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity, dry	CL	2.5	Mt = 0ppm BK = 40cpm
	1355 119555 6/25/93	7	6	SAA	NA	NA	Mt = 0ppm BK = 40cpm
		12	0	No Recovery	NA	NA	Mt = NA BK = NA

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye Erie

Driller: Craig Carter, Billy Sybert

SAA - same as above
NA - not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Bkgd: Mt = 0 ppm BK = 40-60 cpm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-5 Additional Drilling		4706
BORING NUMBER: 21013	COORDINATES:		DATE 6/25/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 6/24/
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 7/2
DRILLING METHODS: Cable Tool			PAGE 9 OF

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 in)	RECOVERY (in)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	1410 119536 6/25/93	3	6	Stiff. 2.5Y(5/1) Gray gravelly clay, no plasticity	CL	1.5	Mt = 0 ppm BG = 40 cpm
	1410 119557 6/25/93	19	5	Dense. 2.5Y(5/4) Lt. olive brown sand w/gravel poorly graded, dry	SP	NA	Mt = 0 ppm BG = 40 cpm
25		22	0	No Recovery	NA	NA	Mt = NA BG = NA
				Begin Bft sampling			Mt = BG =
26							Mt = BG =
							Mt = BG =

NOTES.

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Berkeys Rig

Driller: Craig Carter, Billy Sibert

SA- same as above
NA- not applicable

Samples collected per ASTM standard penetration test.

Colors identified using Munsell Color Chart

Bkgd: Mt = 0 ppm BG = 40-60 cpm

PROJECT NUMBER. 50.03.22	PROJECT NAME. CRU-X additional wells.		
BORING NUMBER: 21063	COORDINATES:	DATE 6/25/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 6/24	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/2	
DRILLING METHODS: Cable Tool		PAGE 10 OF	

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DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
31.5	1515 119558 6/25/93	31 50/3	5	V. dense 2.5Y (5/6) Lt olive brown coarse sand & gravel, poorly graded, dry	SP	NA	Mt = 0 ppm BK = 40 cpm
35	1600 119559 6/25/93	50/4	4	SAA	SP	NA	Mt = 0 ppm BK = 40 cpm
36.5							
40	1620 119560 6/25/93	14 17 22	12	Dense 2.5Y (5/6) Lt olive brown medium grained sand poorly graded, dry	SP	NA	Mt = 0 ppm BK = 40 cpm
41.5							

NOTES.

SAA - same as above
NA - not applicable

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Bucyrus Erie

Driller: Craig Coulter
Bill Sibert

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Rkog: Mt = 0 ppm BK = 40-60 cpm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-5 Additional Wells		
BORING NUMBER: 210163	COORDINATES:	DATE: 11/28/93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 11/2	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 7	
DRILLING METHODS: Cable Tool		PAGE 11	O

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
46.5	1048 119861 6/28/93	31 50/4	6	V. Dense. 10YR (4/6) Dk yellow br. brown med. coarsed sand. [illegible]	SP	NA	Mt = [illegible] BK = 20 [illegible]
50	1100 119862 6/28/93	21 37 50	10	V. Dense. 2.5Y (5/4) Lt olive br. med sand [illegible]	SW	NA	Mt = [illegible] BK = 20 [illegible]
55	1420 119863 6/28/93	50/4	5	SAA	SW	NA	Mt = 0ppm BK = 20cpm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye Ecu

Driller: Craig Coulter

Bill Sibert

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA: same as above

NA: not applicable

Rinse: Mt = 0ppm BK = 40-60cpm

PROJECT NUMBER: 20.03.22	PROJECT NAME: CRU-3 Additional Wells		
BORING NUMBER: 210163	COORDINATES:	DATE	11/28/93
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED	11/2
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED:	7/
DRILLING METHODS: Cable Tool		PAGE	12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
61.5	1660 1660	21 26 30	7	V. Dense. 2.54 (5YR) Light olive brown sandy gravel, well graded, dry	SW	NA	Mt = 0 ppm Bk = 20 cpm
				Begin continuous sampling			
							Mt = Bk =
							Mt = Bk =

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye F-11

Driller: Craig Coulter

Bill Sibert

SAA: same as above
NA: not applicable

Samples collected per ASTM standard practice D1587

Colors identified using Munsell Color Chart

Rkgd: Mt = 0 ppm Bk = 40-60 cpm

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 40.C3.22	PROJECT NAME: CRUK Drilling		
BORING NUMBER: 210R	COORDINATES:	DATE: 11/29/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 11/24/93	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/22/93	
DRILLING METHODS: Cable Tool		PAGE 13 OF 20	

DEPTH (ft)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
62	0805	16		V. Dense 2.54 (5/4) Lt. olive brown sand & gravel, well graded, moist			
	119565	31	12		SW	NA	M.A. = 0 ppm BZ = 20 cpm
63	11/29/93	44					
	0830	8		SAA			
64	119566	24	10		SW	NA	M.A. = 0 ppm BZ = 20 cpm
	11/29/93	31					
65	0840	8		SAA, wet			
	119567	27	12		SW	NA	M.A. = 0 ppm BZ = 20 cpm
66	11/29/93	32					
	0945	9		Dense. 2.54 (5/4) Lt. olive brown fine sand w/gravel, poorly graded, wet			
67	119568	13	18		SP	NA	M.A. = 0 ppm BZ = 20 cpm
	11/29/93	27					
68	1010	7		Dense. 2.54 (5/4) Lt olive brown sand & gravel, well graded, wet			
	119569	13	6		SW	NA	M.A. = 0 ppm BZ = 40 cpm
69	11/29/93	19					
	1030	7		SAA			
70	119570	8	10		SW	NA	M.A. = 0 ppm BZ = 20 cpm
	11/29/93	8					
71	1045	7		SAA			
	119571	5	18		SW	NA	M.A. = 0 ppm BZ = 20 cpm
72	11/29/93	9					
	1055	5		SAA			
73	119572	3	18		SW	NA	M.A. = 0 ppm BZ = 20 cpm
	11/29/93	8					
74		6		No Recovery			
		4	0		NA	NA	
75		6					
				Resume 5ft sampling			

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: [illegible]

Driller: [illegible]

SAA - SAME AS ABOVE
NA - NOT APPLICABLE

Samples collected per ASTM standard practice
Color identified using Munsell Soil Color Chart

4706

PROJECT NUMBER: 40.53.22	PROJECT NAME: CRU-4 Additional Wells		
BORING NUMBER: 21063	COORDINATES:		DATE: 7/1/93
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7/1/93
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 7/1/93
DRILLING METHODS: Cable Tool			PAGE 14 OF

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
81.5	0720 119575 7/1/93	18 17 21	18	Dense 2.5Y(5/4) Lt. Olive Brown SANDS gravel, well graded, wet	SW	NA	Mt = 0ppm BZ = 40ppm
85							
86.5	1100 119576 7/1/93	7 5 11	10	SAA	SW	NA	Mt = 0ppm BZ = 30ppm
90							
91.5	1400 119577 7/1/93	7 11 11	18	SAA			Mt = 0ppm BZ = 20ppm

NOTES:

Drilling Contractor: Annwilanic Drilling

Drilling Equipment: Buckeye F-11

Driller: Craig Coulter

Bill Sibert

SAA: same as above
NA: not applicable

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

Rkad: Mt = 0ppm BZ = 40-60ppm

PROJECT NUMBER: 50.03.22	PROJECT NAME: CRU-X Additional Wells		
BORING NUMBER: 21013	COORDINATES:		DATE 7/2/92
ELEVATION:	GWL: Depth	Date/Time	DATE STARTED: 7/1
ENGINEER/GEOLOGIST: D. O'Brien	Depth	Date/Time	DATE COMPLETED: 7
DRILLING METHODS: Cable Tool			PAGE 12

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
96.5	19357 / 19579 / 7/2/92	5 / 7 / 8	18	Mod. Dense 28 (311) Grey medium grained sand sequence well graded, wet	SW	NA	Mt = Color BK = [illegible]
100	19355 / 19578 / 19580 / 7/2/92	15 / 3 / 21	0	No Recovery	NA	NA	Mt = NA BK = NA
105	19356 / 19581 / 7/2/92	12 / 23 / 31	18	Medium Dense 28 (311) Grey medium grained sand sequence well graded, wet	SW	NA	Mt = [illegible] BK = [illegible]
106.5							

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye F-50

Driller: Craig Coulter, Bill Sibert

SAA: same as above
NA: not applicable

Samples collected per ASTM standard practice D1587

Colors identified using Munsell Color Chart

Rkg: Mt = ppm BK = HC-GC ppm

4706

PROJECT NUMBER. 40.03.22	PROJECT NAME. CRU-5 Additional Wells		
BORING NUMBER: 210163	COORDINATES:	DATE 7/2/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED 7/[illegible]	
ENGINEER/GEOLOGIST. D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/[illegible]	
DRILLING METHODS: Cable Tool		PAGE 111 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER (6 IN)	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
111.5	1100 119539 7/2/93	1 10 14	18	M. Clay 254(5/1) Gray coarse, sand & gravel, well graded, wet	SW	NA	Mt= 0 ppm BZ=[illegible]
116	1100 119584 7/2/93	7 22 38	18	SAA, Dense	SW	NA	Mt= 0 ppm BZ= [illegible]
120	1100 119585	4 7 12	18	SAA, Med. Dense	SW	NA	Mt= 0 ppm BZ= [illegible]
121.5							

NOTES.

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Buckeye F-11

Driller Craig Carter

Bill Sibert

Samples collected per ASTM standard penetration test

Colors identified using Munsell Color Chart

SAA: same as above
NA: not applicable

Rkgd: Mt= 0 ppm BZ= HC-16 ppm

PROJECT NUMBER: 20.03.22	PROJECT NAME: CRU-5 Additional Wells		
BORING NUMBER: 210163	COORDINATES:	DATE: 7/11/93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 7/1	
ENGINEER/GEOLOGIST: D. O'Brien	Depth / Date/Time	DATE COMPLETED: 7/	
DRILLING METHODS: Cable Tool		PAGE 17 OF	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
126.5	0810 119587 7/11/93	23 38 44	18	V. Dark 2.5Y(5/1) Gray coarse sand & gravel, well graded, wet	SW	NA	Mt = 0 ppm BS = 200 ppm
130	0840 119588 7/11/93	4 5 8	18	SAA, Mod Dense	SW	NA	Mt = 0 ppm BS = 200 ppm
131.5							
135	0820 119590 7/12/93	7 14 24	0	No Recovery	NA	NA	Mt = NA BS = NA
136.5							
138	0830 119591 7/12/93	6 11 14		Sm Dense 2.5Y(5/1) Gray coarse sand & gravel, well graded, wet	SW	NA	Mt = 0 ppm BS = 100 ppm

NOTES:

Drilling Contractor: Pennsylvania Drilling

Drilling Equipment: Buckeye Ecu

Driller: Craig Coulter, Bill Sibert

SAA: same as above
NA: not applicable
Samples collected per ASTM standard penetration test
Colors identified using Munsell Color Chart

Rig: Mt = 0 ppm BS = 40-60 ppm

4706

PROJECT NUMBER: 10.03.5	PROJECT NAME: CRU-in Additional Wells		
BORING NUMBER: 210163	COORDINATES:	DATE 7/14/93	
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 6/21	
ENGINEER/GEOLOGIST: D. O'Brien	Depth Date/Time	DATE COMPLETED: 7/	
DRILLING METHODS: Cable Tool		PAGE 18	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
141.5		~~100/5~~ 1230 7/23/93					MT= BS=
145	1050 119891 7/14/93	100/5	2	V. Dense. 2.5Y(5/1) Gray coarse sand w/ large gravel, wet	SW	NA	MT= 0 ppm BS= 40 ppm
146.5							
148	1325 119892 7/14/92	100/5	3	SAA	SW	NA	MT= 0 ppm BS= 20 ppm
149.5				Equip. limitation at 147.5ft			
							MT= BS=

NOTES

Drilling Contractor Pennsylvania Drilling

Drilling Equipment Buckeye Fall

Driller Craig Coulter

Bill Sibert

Samples collected per ASTM standard penetration test

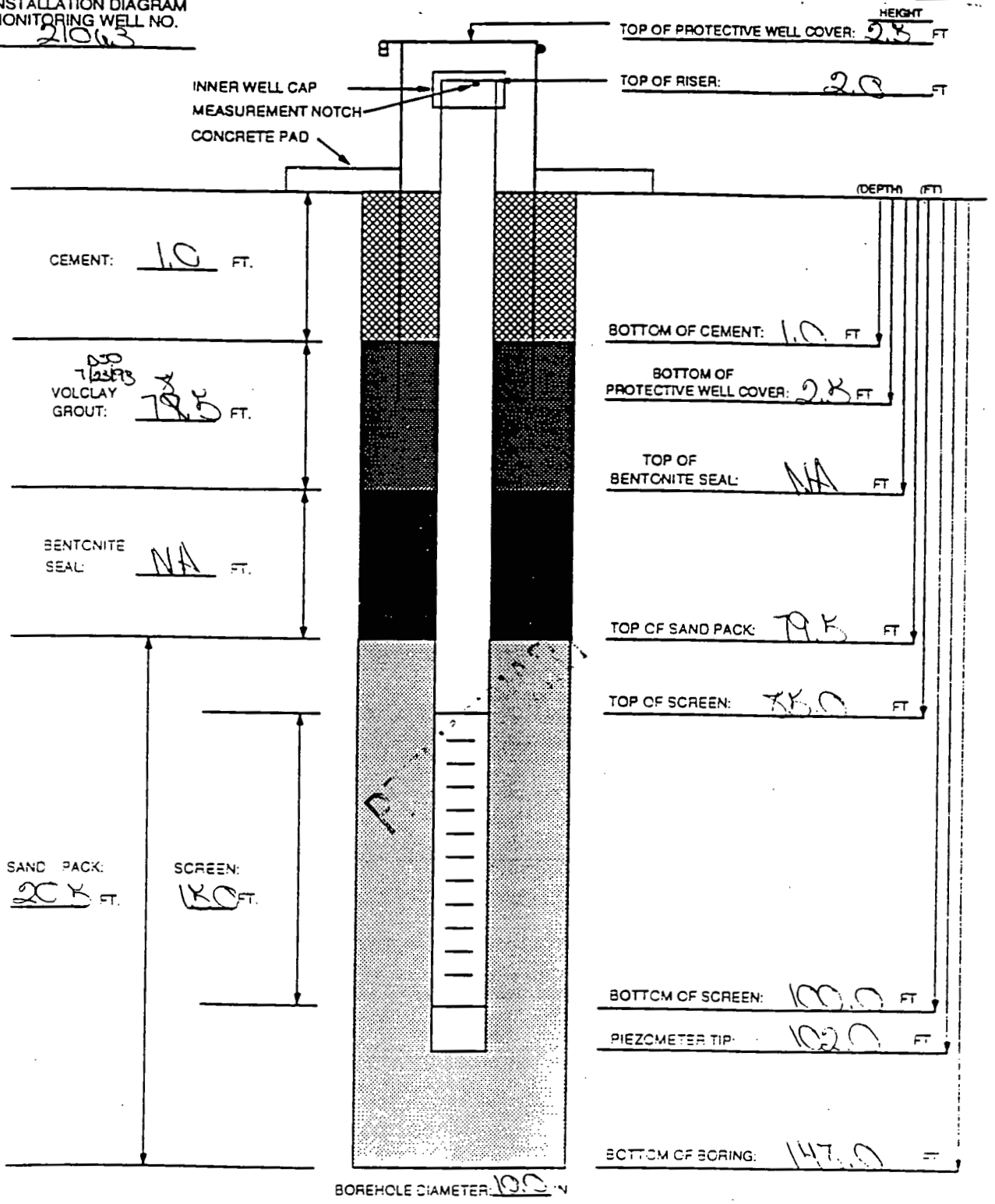
Colors identified using Munsell Color Chart

SAA: same as above
NA: not applicable

Key: MT = ppm BS = HC-1C ppm

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 210163

INSTALLATION DATE: 7/23/93



MATERIALS USED

SAND TYPE AND QUANTITY: 10/20 3½ bags
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 26 bags
AMOUNT OF CEMENT: 1 bag
AMOUNT OF WATER USED: 100 gal
OTHER: [illegible]
TASK: [illegible]

NOTES:

1) RISER PIPE IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS 4.0 IN. ID. 316 STAINLESS STEEL PIPE WITH 0.10 IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE 60.3 FT 1/2
5) TOP OF CASING IS SECURED W[illegible] STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST ENGINEER: [illegible]

RI/FS

4706

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS Drilling FIELD ENG./GEO. D.O'Brien DATE 7/23/9
PROJECT NO. 80.03.22 CHECKED BY _____ DATE _____
BORING NO. 21063
PIEZOMETER NO. 21063 DATE OF INSTALLATION 7/22/93

BOREHOLE DRILLING

DRILLING METHOD Cable Tool	TYPE OF BIT Churn Bit
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID H_2O FROM 0.0ft TO 70.0ft	SIZE 10.0in FROM 0.0 TO 180.0
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE Monitoring Well	RISER PIPE MATERIAL 316 stainless steel
DIAMETER OF PERFORATED SECTION 4.0in	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. 4 3/8in I.D. 4.0in
SLOTS ☒ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS ~~5.0~~ Section 1-10.0ft 1-5.0ft
AVERAGE SIZE OF PERFORATIONS 0.010in	JOINING METHOD Flush joint
TOTAL PERFORATED AREA 15.0 ft	threaded

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5.0ft	OTHER PROTECTION bumper locking cover
PROTECTIVE PIPE O.D. 10 3/4in	w/padlock

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (~~FT~~)		ELEVATION ( )	
TOP OF RISER PIPE	2.0			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	2.5			
BOREHOLE FILL MATERIALS:				
Cement GROUT/SLURRY	TOP 0.0 1.0	BOTTOM 1.0 79.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP 79.5	BOTTOM 100.0	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP 85.0	BOTTOM 100.0	TOP	BOTTOM
PIEZOMETER TIP	102.0			
BOTTOM OF BOREHOLE	146.0			
GWL AFTER INSTALLATION	10.2			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS _____

FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS/PHASE II		
BORING NUMBER 11101	COORDINATES		DATE 16/22 JUL 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 16 JUL 93
ENGINEER/GEOLOGIST B. E. MULLER	Depth	Date/Time	DATE COMPLETED 23 JUL 93
DRILLING METHODS HOLLOW STEM AUGER			PAGE 1 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	16JUL 121233 121234 121236	10	6	DENSE (2.5Y, 4/3) OLIVE BROWN, WELL GRADED MEDIUM SAND, TRACE GRAVEL, DRY	SM	–	MT: 0 BY: 100 A
1	121236 121237 121238 121239	28	6	SAA	SM	–	ARCHIVE
	0945	12	6	SAA 26JUL93 BEM ~~STIFF (2.5Y, 6/3)~~ HARD (2.5Y, 5/6) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SAND, GRAVEL LOW PLASTICITY, SLIGHTLY MOIST	CL	4.5	TIME: 0945 A
	16JUL 121240	10	6	SAA STIFF (2.5Y, 6/1) GRAY, SILTY CLAY, TRACE SAND, MEDIUM PLASTICITY, MOIST	CL	2.0	MT: 0 BY: 100 ARCHIVE
2	121241	10	6	SAA	CL	1.0	ARCHIVE
	121242 121243 121244 1030	12	6	SAA STIFF (2.5Y, 2/1) VERY DARK GRAY, SILTY CLAY, MEDIUM-HIGH PLASTICITY, MOIST	CL	1.0	TIME: 1030 A
3	22JUL 121543	15	6	STIFF (2.5Y, 3/1) ~~SAA~~ 26JUL93 BEM VERY DARK GRAY SILTY CLAY, TRACE ORGANICS, MEDIUM PLASTICITY, MOIST	CL	2.0	MT: 1.0 BY: 100 ARCHIVE
	121544	12	6	SAA	CL	2.0	BACKGROUND M.T.: 0.7 BY: 70 ARCHIVE
4	121545 0802	13	5	SAA	CL	2.0	ARCHIVE TIME 0802
	22JUL 121546	15	6	STIFF (2.5Y, 4/3) OLIVE BROWN SILTY CLAY, TRACE YELLOW AND RED MOTTLES, MEDIUM PLASTICITY, MOIST	CL	2.0	MT: 0 BY: 70 ARCHIVE
5	121547	16	6	SAA	CL	1.75	ARCHIVE
	121548 0848	12	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE ORANGE AND GRAY MOTTLES, SAND, MEDIUM PLASTICITY, MOIST	CL	1.75	TIME: 0848 ARCHIVE

DRILLING FIRM: PENN DRILL
DRILLERS: RON CONNERS, TED BAIS
RIG: SIMCO 4000 TR2
DRILLING BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = ppm
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP 0 ppm
BY 80 CPM
α N/A CPM
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

FERNALD
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUT / PHASE II		
BORING NUMBER 11101	COORDINATES		DATE 22/23 JUL 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 16 JUL 93
ENGINEER/GEOLOGIST B. E. MULLER	Depth	Date/Time	DATE COMPLETED 23 JUL 93
DRILLING METHODS HOLLOW STEM AUGER			PAGE 2 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	22 JUL 121549 121550 121551	12	6	STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN, SILTY CLAY, TRACE GRAY AND ORANGE MOTTLES, MEDIUM PLASTICITY, MOIST	CL	1.5	MT: 0.2 BY: 70 A
	121552	8	6	SAA	CL	1.5	ARCHIVE
7	121553 0940	9	2/0	SAA	CL	1.5	ARCHIVE TIME: 0940
	22 JUL 121554	8	6	VERY STIFF (2.5Y, 6/2) LIGHT BROWNISH GRAY, SILTY CLAY, TRACE ORANGE MOTTLES, SAND, GRAVEL, MEDIUM PLASTICITY, MOIST	CL	2.25	MT: 0 BY: 90 ARCHIVE
8	121555	9	6	SAA	CL	2.5	ARCHIVE
9	121556 1326	12	6	VERY STIFF (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE GRAY MOTTLES, SAND, GRAVEL, MEDIUM PLASTICITY, MOIST	CL	3.75	ARCHIVE TIME: 1326
	22 JUL 121557 121558 121559	20	6	HARD (2.5Y, 5/4) LIGHT OLIVE BROWN SILTY CLAY, TRACE GRAY MOTTLES, SAND GRAVEL, MEDIUM PLASTICITY, MOIST	CL	>4.5	MT: 0 BY: 70 A
	121560	28	6	SAA	CL	>4.5	ARCHIVE
10	121561 1338	28	6	HARD (5Y, 4/1) DARK GRAY, SILTY CLAY, TRACE GRAVEL, LOW PLASTICITY, SLIGHTLY MOIST	CL	>4.5	ARCHIVE TIME: 1338
	23 JUL 121566	5	6	VERY STIFF (2.5Y, 5/3) LIGHT OLIVE BROWN, SILTY CLAY, TRACE SAND, GRAVEL MEDIUM PLASTICITY, MOIST	CL	2.75	MT: 3.0 BY: 120 ARCHIVE
11	121567	6	6	SAA	CL	0.75	BACKGROUND M.T. 0.7 BY 80 ARCHIVE
	121568 0826	6	5	VERY STIFF (2.5Y, N3/) VERY DARK GRAY, SILTY CLAY, TRACE ORGANICS, SANDY YELLOW MOTTLES, MEDIUM PLASTICITY MOIST	CL	2.25	ARCHIVE TIME: 0826

DRILLING FIRM: PENN DRILL
DRILLERS: RON COUNTERS, TED BAIS
RIG: SIMCO 4000 TR2
DEPTH [illegible] BASED ON MUNSELL

UNITS MEASURED:
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP 0 PPM
BY 70 CPM
α N/A CPM
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

FERNALD
RI/FS

4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18	PROJECT NAME CRUS/PHASE II		
BORING NUMBER 11101	COORDINATES		DATE 23 JUL 93
ELEVATION	GWL. Depth	Date/Time	DATE STARTED 16 JUL 93
ENGINEER/GEOLOGIST B.E. MULLER	Depth	Date/Time	DATE COMPLETED 23 JUL 93
DRILLING METHODS HOLLOW STEM AUGER			PAGE 3 OF 6

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 IN	RECOVERY (IN)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
	23 JUL 121569 121570 121571	12	6	HARD (2.5Y 4/3) OLIVE BROWN, SILTY CLAY, TRACE SAND, GRAVEL, MEDIUM PLASTICITY, MOIST	CL	>4.5	MT: 0 BY: 80 A
13		17	6	SAA	CL	>4.5	A
	121573 0925 23 JUL	20	2	HARD (5Y 5/1) GRAY, SILTY CLAY TRACE ORANGE MOTTLES, SAND, GRAVEL, LOW PLASTICITY, MOIST	CL	>4.5	ARCHIVE TIME: 0925
14	121574	27	6	SAA	CL	>4.5	MT: 0 BY: 100 ARCHIVE
	121575	30	6	SAA	CL	4.25	ARCHIVE
15	121576 0940 23 JUL	30	6	VERY DENSE (5Y, 4/1) DARK GRAY SILTY SAND, WET	SM	—	ARCHIVE TIME: 0940
	121577 121578 121579	22	6	SAA	SM	—	MT: 0 BY: 80 A
		25	6	VERY DENSE (5Y, 4/1) DARK GRAY, SILTY SAND, WET	SM		
16				VERY STIFF (2.5Y, 5/1) GRAY, SILTY CLAY, TRACE SAND, GRAVEL	3.75	3.75	A
	121581 0955	31	6	MEDIUM PLASTICITY, MOIST	CL		
				VERY DENSE (5Y, 4/1) DARK GRAY SILTY SAND, WET	SM	—	ARCHIVE TIME 0955
17				BOTTOM OF BORING			MT: BY:
							TIME:

DRILLING FIRM: PENN DRILL
DRILLERS: RON CONVERS, TED BAIS
RIG: SIMCO 4000 TR2
DEFINITIONS BASED ON MUNSELL

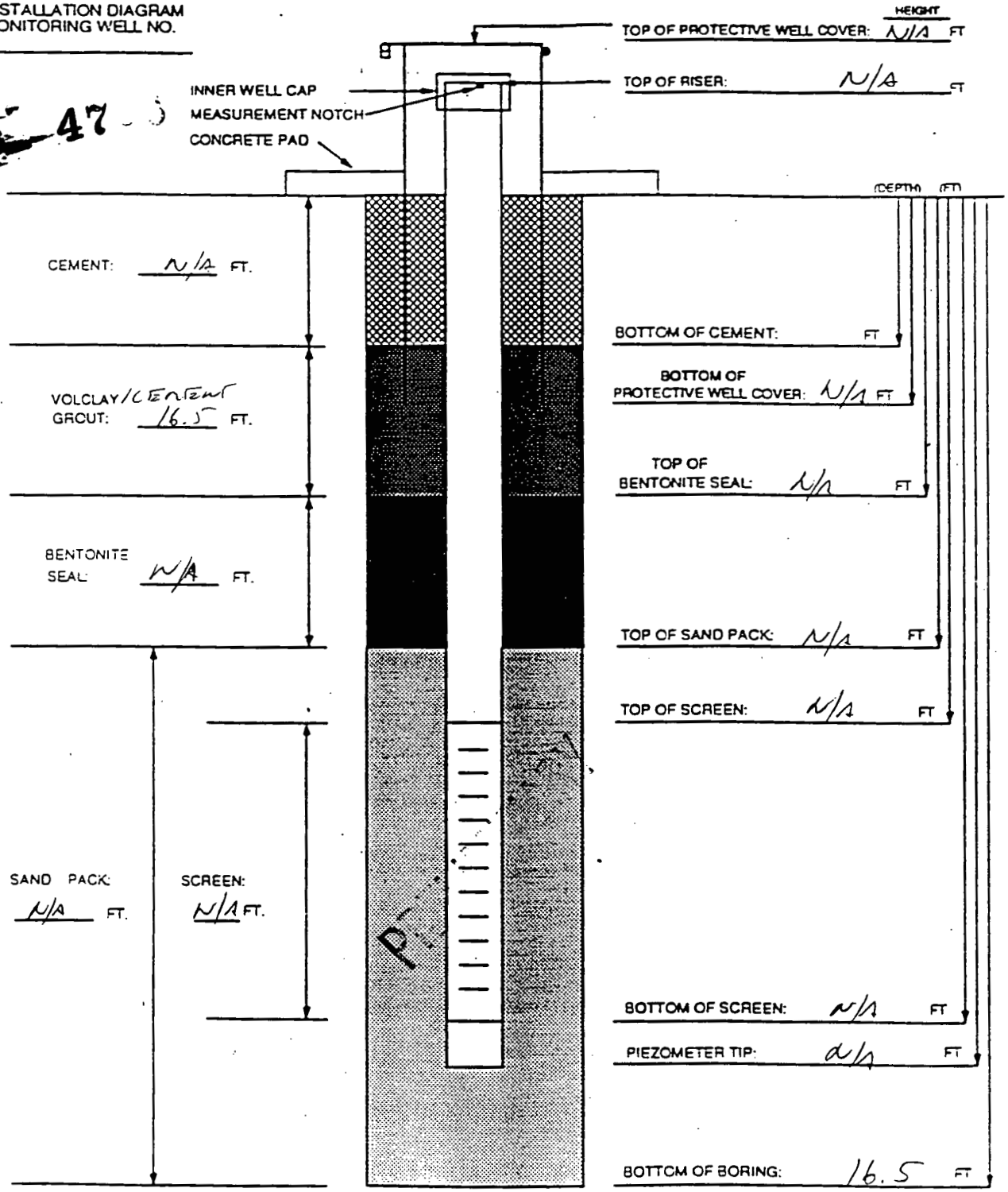
UNITS MEASURED:
MICROTIP = PPM
BY = CPM
α = CPM

BACKGROUND READINGS:
MICROTIP 0 PPM
BY 80 CPM
α N/A CPM
NO RECOVERY (NR)
SAME AS ABOVE (SAA)

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. _____

47

INSTALLATION DATE: 23JUL93



BOREHOLE DIAMETER: 10 IN.

ATERIALS USED:

NO. TYPE AND QUANTITY: N/A
NTONITE PELLETS (5-GALLON BUCKETS): N/A
GS OF VOLCLAY GROUT: 3 (BAGS)
OUNT OF CEMENT: 1 BAG
OUNT OF WATER USED: 30 GALS
HER: N/A
SK: 50.03.18

NOTES:

1) RISER PIPE IS N/A IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS N/A IN. ID. 316 STAINLESS STEEL PIPE WITH 0. N/A IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE N/A FT; N/A
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK

GEOLOGIST/ENGINEER: B. E. MULLER

FORM 0157 REV. (0)

4706

5/6

FERNALD RI/FS

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS/PHASE II FIELD ENG./GEO. B.E. MULLER DATE 24JUL93
PROJECT NO. 50 03.18 CHECKED BY _____ DATE _____
BORING NO. 11101
PIEZOMETER NO. N/A DATE OF INSTALLATION 27 JUL 93

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER	TYPE OF BIT HOLLOW STEM AUGER
DRILLING FLUID (S) USED:	CASING SIZE (S) USED:
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A
FLUID N/A FROM N/A TO N/A	SIZE N/A FROM N/A TO N/A

PIEZOMETER DESCRIPTION

TYPE N/A	RISER PIPE MATERIAL N/A
DIAMETER OF PERFORATED SECTION N/A	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. N/A I.D. N/A
SLOTS ☐ HOLES ☐ SCREEN ☐	LENGTH OF PIPE SECTIONS N/A
AVERAGE SIZE OF PERFORATIONS N/A	JOINING METHOD N/A
TOTAL PERFORATED AREA N/A	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH N/A	OTHER PROTECTION N/A
PROTECTIVE PIPE O.D. N/A	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION ( )	
TOP OF RISER PIPE	N/A			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	N/A			
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 0	BOTTOM 16.5	TOP	BOTTOM
BENTONITE	TOP N/A	BOTTOM N/A	TOP	BOTTOM
SAND	TOP N/A	BOTTOM N/A	TOP	BOTTOM
GRAVEL	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PERFORATED SECTION	TOP N/A	BOTTOM N/A	TOP	BOTTOM
PIEZOMETER TIP	N/A			
BOTTOM OF BOREHOLE	16.5			
GWL AFTER INSTALLATION	9.25			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? N/A YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? N/A YES ☐ NO ☐
REMARKS _____

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4706
FERNALD
RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5	
BORING NUMBER: 11093	COORDINATES:	DATE: 7-22-93
ELEVATION:	GWL: Depth Date/Time	DATE STARTED: 7-22-93
ENGINEER/GEOLOGIST: RILEY	Depth Date/Time	DATE COMPLETED: 7-23-93
DRILLING METHODS:		PAGE 1 OF 4

	DEPTH (FEET)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (INCH)	RECOVERY (INCH)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
#1	0.0 – 0.5	122151 122152 122153 0880 7-22-93	25	6	DENSE, LIGHT OLIVE BROWN (2.5Y 5/4) SILT SAND (WELL GRADED) WITH GRAVEL, DRY	SM	NA	MICROTIP = 10.8 PPM BG = 150 CPM
DUP	0.5 – 1.0	122154 122155 122156 0880 7-22-93	41	6	HARD, LIGHT OLIVE BROWN (2.5Y 5/6), SILTY CLAY, WITH TRACE OF GRAVEL & SAND, MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	4.5	
TAL #2	1.0 – 1.5	122157 122158 122159 0880 7-22-93	35	6	VERY STIFF LIGHT OLIVE BROWN (2.5Y 5/6) SILTY CLAY, WITH TRACE OF GRAVEL & SAND, MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	3.0	
	1.5 – 2.0	122160 0900 ~~0880~~ 7-22-93	24	6	MEDIUM STIFF, OLIVE GRAY (5Y 4/2) SILTY CLAY, MEDIUM PLASTICITY, MOIST	CL	1.0	MICROTIP = 6.5 PPM BG = 100 CPM
	2.0 – 2.5	122161 0900 7-22-93	20	6	SAA	CL	1.0	
TAL #3	2.5 – 3.0	122162 122163 122164 0900 7-22-93	18	6	HARD, GRAY (5Y 6/1) MOTTLED W/ OLIVE (5Y 5/4) SILTY CLAY, WITH SOME GRAVEL, MEDIUM PLASTICITY, MOIST	CL	4.5	
	3.0 – 3.5	122165 0940 7-22-93	17	6	VERY STIFF, VERY DARK GRAYISH BROWN (2.5Y 3/2), SILTY CLAY, MEDIUM PLASTICITY SLIGHTLY MOIST	CL	3.0	MICROTIP = 2.0 PPM BG = 80 CPM
	3.5 – 4.0	122166 0940 7-22-93	22	6	SAA	CL	3.0	
	4.0 – 4.5	122167 0940 7-22-93	14	6	VERY STIFF LIGHT OLIVE BROWN (2.5Y 5/4) SILTY MOTTLED CLAY (2.5Y 3/1) VERY DARK GRAY MEDIUM PLASTICITY, SLIGHTLY MOIST	CL	2.5	
	4.5 – 5.0	122168 0955 7-22-93	14	6	SAA	CL	2.0	MICROTIP = 2.0 PPM BG = 80 CPM

NOTES:

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JEFF BEVELY
Helper : MIKE LITTLETON

SAA = Same As Above
N/A = Not Applicable

Background = BG : 60 CPM
MT = 0.0 PPM

• Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

FERNALD RI/FS

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 50.03.18	PROJECT NAME: CRU 5		
BORING NUMBER: 11093	COORDINATES:	DATE: 7-22-93	
ELEVATION:	GWL: Depth / Date/Time	DATE STARTED: 7-22-93	
ENGINEER/GEOLOGIST: RILEY	Depth / Date/Time	DATE COMPLETED: 7-23-93	
DRILLING METHODS: AUGER		PAGE 2 OF 4	

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
5.0	122169 0955 7-22-93	17	6	STIFF SAA	CL	1.5	SEE PREVIOUS PAGE.
5.5	122170 0955 7-22-93	12	6	SAA	CL	1.5	
6.0	122171 122172 122173 0755 7-23-93	NA	6	SAA	CL	1.5	MICROTIP = 2.8 PPM BY = 100 CPM
TAL #4 6.5	122174 0755 7-23-93	C	6	STIFF, LIGHT OLIVE BROWN (2.5Y 5/6) w/ (5Y 6/1) GRAY, SILTY CLAY, MOTTLED, WITH TRACE OF SAND, MED. PLASTICITY, MOIST	CL	1.0	
7.0	122175 0755 7-23-93	M E	6	SAA	CL	1.0	
7.5	122176 0755 7-23-93	NA	6	STIFF, GRAY (5Y 6/1), SILTY CLAY MOTTLED w/ LIGHT OLIVE BROWN (2.5Y 5/6) WITH TRACE OF SAND, MED. PLASTICITY, MOIST	CL	1.0	MICROTIP = 2.8 PPM BY = 100 CPM
8.0	122177 0755 7-23-93	C M	6	SAA	CL	1.5	
8.5	122178 0755 7-23-93	E	6	STIFF, GRAY (5Y 6/1) CLAYEY SILT, MOTTLED w/ LIGHT OLIVE BROWN (2.5Y 5/6) WITH TRACE OF SAND, SLIGHT PLASTICITY, MOIST	ML	1.5	
9.0	122179 122180 122181 0755 7-23-93	NA	6	MEDIUM STIFF, SAA WITH SOME SAND WET	ML	0.5	MICROTIP = 1.7 PPM BY = 80 CPM
TAL #5 9.5							

NOTES

Drilling Contractor: Pennsylvania Drilling
Drilling Equipment : AUGER
Driller : JEFF BENTLEY
Helper : MIKE LITTLETON

SAA = Same As Above
N/A = Not Applicable

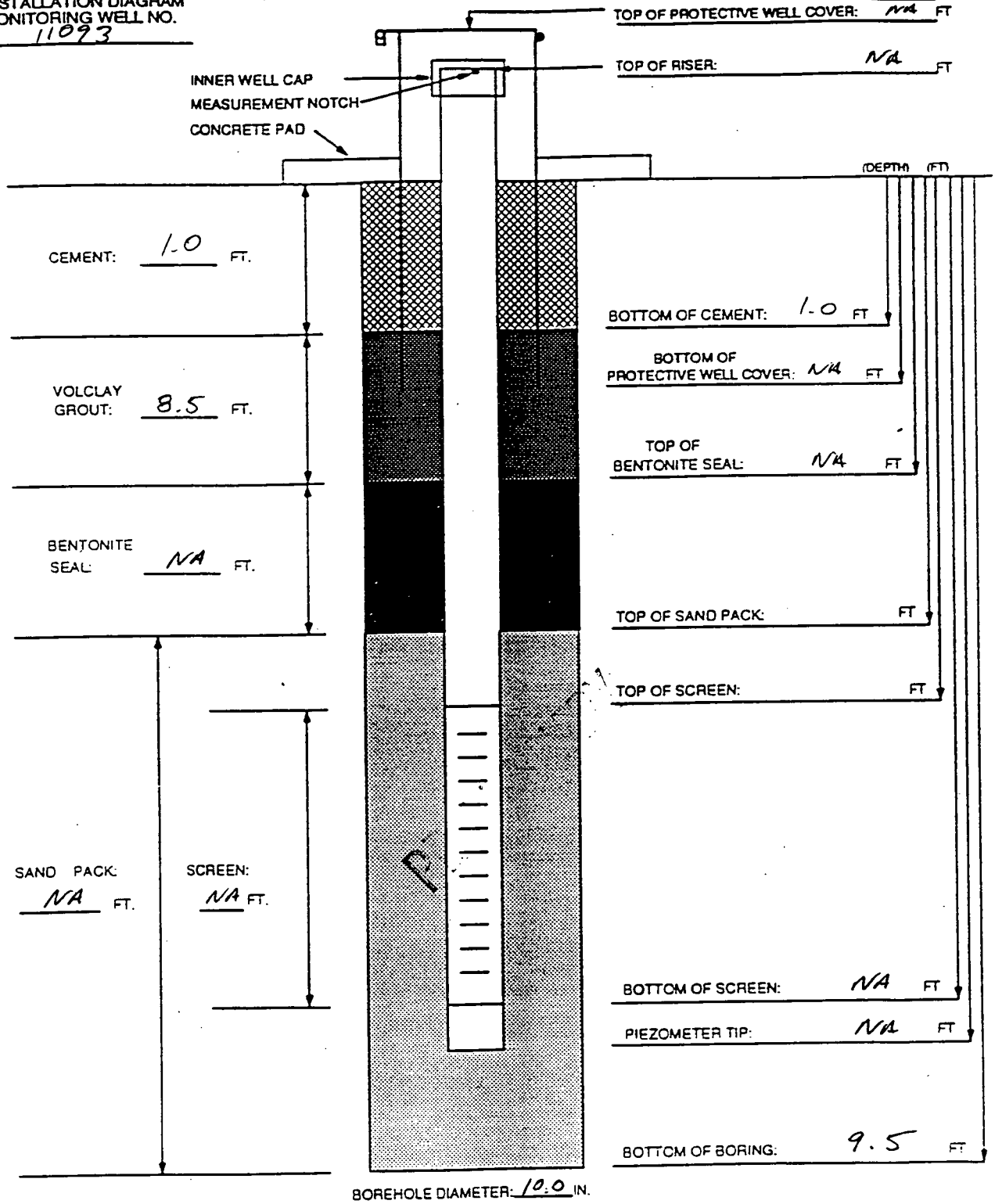
Background = 7-23-93
BY = 80 cpm
MT = 0.3 ppm

* Samples collected per ASTM Standard Penetration Test.
* All colors identified by the Munsell Color Chart.

402-11-86

4706 FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 11093

INSTALLATION DATE: 7-23-93



BOREHOLE DIAMETER: 10.0 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 3 BAGS
AMOUNT OF CEMENT: 1 BAG
AMOUNT OF WATER USED: 5 GALLONS
OTHER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT. NA
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: PAT RILEY

(SI FORM 0157 REV 10)

RI/FS

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PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRU 5 FIELD ENG./GEO. RILEY DATE 7-23-
PROJECT NO. 50-03-18 CHECKED BY DATE
BORING NO. 11093
PIEZOMETER NO. NA DATE OF INSTALLATION PA 7-23-93 ~~6~~ 7-23-93

BOREHOLE DRILLING

DRILLING METHOD AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT AUGER
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D: NA

OTHER PROTECTION NA

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION ( )	
TOP OF RISER PIPE	NA			
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE	NA			
BOREHOLE FILL MATERIALS: CONCRETE	TOP 0.0	BOTTOM 1.0		
GROUT/SLURRY	TOP 1.0	BOTTOM 9.5	TOP	BOTTOM
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
GRAVEL	TOP NA	BOTTOM NA	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	9.5			
GWL AFTER INSTALLATION	NA			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☒
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒
REMARKS NA

FERRALLOY
RI/FS
4706

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER 50.03.18 20.03.05 7/23	PROJECT NAME. CRUS SOIL BORING / SAMPLING		
BORING NUMBER. 11194	COORDINATES.	DATE 7/23/93	
ELEVATION:	GWL: Depth NA Date/Time	DATE STARTED 7/23/93	
ENGINEER/GEOLOGIST K. TAPPA	Depth Date/Time	DATE COMPLETED 7/23/93	
DRILLING METHODS		PAGE 1 OF 3	

DEPTH (FT)	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER 6 (IN.)	RECOVERY (IN.)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	BACKGROUND MT = 1.0 ppm REMARKS BG = 80-100 cpm
1	122072, 122073, 122074 0830 7-23-93	15	6	(2.5Y, 4/4) Sandy clay, olive brown, low plasticity, hard, moist, roots, occasional fine gravel	>4.5	CL	MT = 1.0 ppm
	122075 0830 7-23-93	13	6	(10YR, 4/3) Sandy clay, brown, low plasticity, hard, moist, roots.	>4.5	CL	BG = 80-100 cpm
	122076, 122077, 122078 0830 7-23-93	17	6	SAA	>4.5	CL	
2	122079 0840 7-23-93	11	6	(2.5Y, 5/6) Sandy clay, light olive brown, med. plasticity, very stiff, occasional roots, moist	2.25	CL	M = 1.0 ppm
	122080 0840 7-23-93	11	6	SAA	.75	CL	
	122081, 122082, 122083 0840 7-23-93	16	6	(2.5Y, 5/6) SAA 22.5Y, 5/6) silty sand, fine-grained, med. dense, poorly graded, lt. olive brown, wet.	NA	CL SM	BG = 80-100 cpm
3	122084 0900 7-23-93	7	6	SAA	NA	SM	MT = 1.0 ppm
	122085 0900 7-23-93	11	6	(2.5Y, 5/6) sandy clay, lt. olive brown, mottled, very stiff, med. plasticity, moist (2.5Y, 5/6) silty sand, fine grained, med. dense, poorly graded, wet	2.5	CL SM	
4	122086 0900 7-23-93	23	6	SAA (2.5Y, 5/6) sandy clay, lt. olive brown, mottled, very stiff, moist (2.5Y, 5/6) sandy gravel with some silt, fine-coarse, poorly graded, wet	NA NA NA	SM CL GM	BG = 80-100 cpm
	122087, 122088, 122089 0900 7-23-93	22	6	SAA (2.5Y, 5/6) sandy clay, lt. olive brown, mottled, fine to med. gravel, low plasticity, stiff, moist.	3.6	GM CL	
5							
6							
7							

NOTES

Drilling Contractor Pennsylvania Drilling
Drilling Equipment ACKER DRILL 2
Driller JOE RAAB
JAMES ANDERSON

SAA - Same as above
NA - Not Applicable
NR - No Recovery

Samples collected per ASTM standard penetration
Colors identified using Munsell Color Chart

FERNALD
RI/FS

4706

P. 2 OF 3

PIEZOMETER INSTALLATION SHEET

PROJECT NAME CRUS SOIL BORING & SAMPLING
PROJECT NO. 50.03.18
BORING NO. 11194
PIEZOMETER NO. NA

FIELD ENG./GEO. K. TAPPA
CHECKED BY
DATE 7/24
DATE
DATE OF INSTALLATION 7/24/93

BOREHOLE DRILLING

DRILLING METHOD HOLLOW STEM AUGER
DRILLING FLUID (S) USED:
FLUID NA FROM NA TO NA
FLUID NA FROM NA TO NA

TYPE OF BIT NA
CASING SIZE (S) USED:
SIZE NA FROM NA TO NA
SIZE NA FROM NA TO NA

PIEZOMETER DESCRIPTION

TYPE NA
DIAMETER OF PERFORATED SECTION NA
PERFORATION TYPE: NA
SLOTS ☐ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS NA
TOTAL PERFORATED AREA NA

RISER PIPE MATERIAL NA
RISER PIPE DIAMETERS:
O.D. NA I.D. NA
LENGTH OF PIPE SECTIONS NA
JOINING METHOD NA

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH NA
PROTECTIVE PIPE O.D. NA

OTHER PROTECTION NA

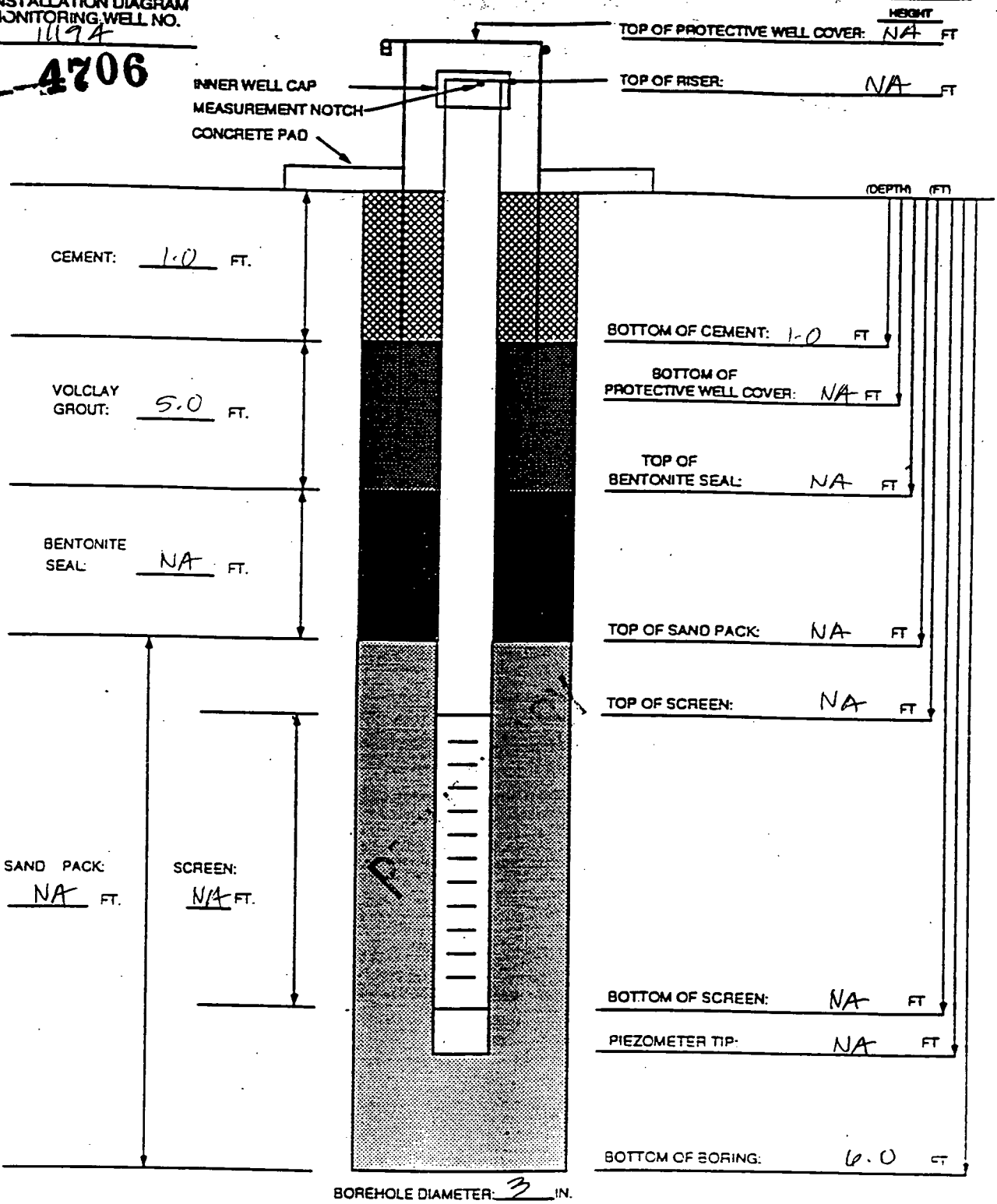
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
TOP OF RISER PIPE	NA		NA	
GROUND SURFACE	0.0		NA	
BOTTOM OF PROTECTIVE PIPE	NA		NA	
BOREHOLE FILL MATERIALS:				
GROUT/SLURRY	TOP 1.0 FT	BOTTOM 6.0 FT	TOP NA	BOTTOM NA
BENTONITE	TOP NA	BOTTOM NA	TOP	BOTTOM
SAND	TOP NA	BOTTOM NA	TOP	BOTTOM
~~GRAVEL~~ CEMENT	TOP 0.0 FT	BOTTOM 1.0 FT	TOP	BOTTOM
PERFORATED SECTION	TOP NA	BOTTOM NA	TOP	BOTTOM NA
PIEZOMETER TIP	NA			
BOTTOM OF BOREHOLE	6.0 FT			
GWL AFTER INSTALLATION	NA		NA	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☐
REMARKS

FERNALD RI/FS
INSTALLATION DIAGRAM
MONITORING WELL NO. 1194

4706

INSTALLATION DATE: 7/24/93



BOREHOLE DIAMETER: 3 IN.

MATERIALS USED

SAND TYPE AND QUANTITY: NA
BENTONITE PELLETS (5-GALLON BUCKETS): NA
BAGS OF VOLCLAY GROUT: 1 50 LB. BAG
AMOUNT OF CEMENT: 1/2 BAG
AMOUNT OF WATER USED: NA
OTHER: NA
TASK: 50.03.18

NOTES:

1) RISER PIPE IS NA IN. ID. 316 STAINLESS STEEL PIPE, FLUSH-THREADED JOINTS.
2) SCREEN IS NA IN. ID. 316 STAINLESS STEEL PIPE WITH 0. NA IN. SLOTS.
3) LOWER END OF SCREEN IS CAPPED WITH AN END CAP OR THREADED SUMP.
4) WATER DEPTH AND DATE NA FT: ____
5) TOP OF CASING IS SECURED WITH A STAINLESS STEEL CAP.
6) PARENTHESIS INDICATE DEPTH BELOW GROUND LEVEL.
7) WELL CASING HAS A PROTECTIVE COVER WITH PADLOCK.

GEOLOGIST/ENGINEER: K. TAPPA

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FORM 0157 REV. ____